Ohio Department of Agriculture
2013 Final Report
Specialty Crop Block Grant - Farm Bill
AMS-FV-2013
AMS Agreement # 12-25-B-1690

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Project Title: OSU -- Preparing Growers to Comply with FSMA and OPMA

Project Summary

The main goal for this project was to deliver produce safety educational programs to the estimated 1700-2200 fruit and vegetable growers who had not yet attended a 3-hour Good Agricultural Practices or 'GAPs' class presented by The Ohio State University Fruit and Vegetable Safety Team (OSU FVST). Fresh produce continues to surface as the source of food borne illness outbreaks. The FDA has responded to this trend by implementing the Food Safety Modernization Act (FSMA) Produce Safety Rule. Growers were made aware of the standards written in the rule through the good agricultural practices (GAPs) class the OSU Fruit and Vegetable Safety Team delivered throughout Ohio. The courses provided content to help growers better prepare for the FDA Food Safety Modernization Act (FSMA) Produce Safety Rule. Additional objectives for this project were to develop advanced programs to build off of the 'core' 3-hour GAPs class and provide in-service programs to train Ohio State University Extension Agriculture & Natural Resource (OSUE ANR) Educators on the latest produce safety research and federal regulations. This project complimented a similar project funded in 2011 by a SCBGP by offering similar information that still held relevance in produce safety education and outreach. This project enhanced the 2011 project by adding a module on how to write a farm food safety plan and by updating existing educational information no longer relevant to produce industry stakeholders.

Highlights from this project include:

-Delivered 42 GAPs classes to 1046 produce industry stakeholders in Ohio
-Supplied recordkeeping logs and standard operating procedure templates to each GAPs class attendee
-Established a team of educators equipped to address concerns stakeholders have related to on-farm fruit and vegetable safety

Project Approach

The first step to maintain a robust educational program was to update the existing 3-hour GAPs program to reflect the most current proposed regulations in the FSMA produce safety rule. Over the two-year funded period, the produce safety rule standards were modified to better address concerns industry stakeholders had. The continuous evolution of the act required ongoing modification of content of the core class.

To ensure fruit and vegetable growers were made aware of the educational opportunity, the Program Coordinator promoted the program to all of Ohio's extension offices to ensure courses were published adequately. Additionally, the Program Coordinator posted events on the OSU produce safety website (producesafety.osu.edu) and Tweeted event updates on the @FruitVegSafety Twitter account. Farmers' market managers notified the vendors who sold fruits and vegetables at the market and those were the vendors that attended a class. Vendors not selling

specialty crops would not benefit from this class in the slightest as it educates growers specifically on risk assessment and risk reduction in a produce operation environment.

OSUE Educators delivered classes to growers during the 2013/2014 and 2014/2015 winter months at Extension offices, produce auction houses, and other grower-friendly locations. Attendees received a 3-ring binder of recordkeeping logs and standard operating procedure templates, along with pertinent factsheets and produce safety flash drives.

The next step was to enhance the educational program by adding new, advanced-level curriculum. Audit Preparedness and Recall Preparedness were additional modules that were identified as needed through a process of stakeholder consultation. The Audit Preparedness module was developed and ultimately renamed Developing a Farm Food Safety Plan to better reflect the educational needs of the growers. A 3-hour pilot program was delivered to 40 small and medium-sized growers who had already attended the core 3-hour program. After evaluating development and initial delivery of the Developing a Farm Food Safety Plan, the Recall Preparedness module transformed into a factsheet, made available to core class attendees.

During the summer months, OSUE Educators involved in the OSU FVST attended two in-service seminars. Content included a review of the produce safety courses offered through the program, and new information about challenges facing the produce industry from a food safety standpoint. Four topics presented during the in-services were: Water Quality and Testing presented by Sanja Ilic (OSU Human Sciences), Grower Liability presented by Peggy Hall (OSUE attorney), Post-Harvest Sanitation presented by Ahmed Yousef (OSU Food Science and Technology), and Digital Food Safety Plan Programming and Traceability presented by Robert Holthouse (Food Safety Manager at Holthouse Farms and D.R. Walcher Farms). After the formal in-service presentations, Educators were able to have open discussion with presenters to optimize learning and help improve produce safety program content.

At the end of the growing season, program effectiveness evaluations were distributed to growers and then collected for data entry and analysis. Statistical summaries and analyses were performed using SAS ® Version 9.4.

Goals & Outcomes Achieved

The core 3-hour GAPs program continued to gain momentum throughout the funded period and our intentions of delivering programs in geographically favorable locations was highly successful. Forty-two classes were presented to 1046 produce industry stakeholders. Several classes were delivered in locations, such as Mount Victory, Ohio in Hardin County, which had not previously been exposed to produce safety education. Our program reached new attendees as well as folks who had attended in previous years.

To encourage growers to begin their farm food safety plans, a 3-ring binder with recordkeeping logs and standard operating procedure templates was distributed to each attendee. From the program effectiveness evaluation survey that was analyzed, 56% of respondents indicated that the "Traceability" section of the 3-ring binder was the most helpful section to them and 45% percent indicated that they agreed/strongly agreed that the binder helped them improve their on-farm food

safety practices. Other highlights from the core program effectiveness evaluation indicated that 61% of respondents 'agreed/strongly agreed' that the GAPs class met their expectations. Eighty percent felt the information presented during the class was useful to them, and 61% of attendees felt more prepared to comply with produce safety regulations after attending the class.

The pre-test/post-test method used in previous years captured the success of very specific aspects of the 3-hour class without fully gauging program effectiveness. While test scores were able to reflect how successful the presenter was at delivering topics related to the test-specific questions, scores did not indicate how well growers implemented classroom lessons at the farm level and whether or not their expectations were met during the class. The Program Coordinator saw benefit in distributing follow-up surveys at the end of the growing season to identify whether or not GAPs class information and materials were being used at the farm level and to get a sense of attendee satisfaction. The follow-up surveys were conducted in place of the pre/post-test method because the Program Coordinator wanted to gauge program effectiveness once the grower applied his/her knowledge to his/her operation. The follow-up survey indicated that 73% of the respondents were utilizing the 3-ring binder distributed at the OSU GAPs class. The follow-up survey replaced the pre/post-test model altogether, so the goal didn't necessarily line up perfectly with the results. Since the follow-up survey was used to gauge program effectiveness at the farm level and not on whether or not test scores changed, it didn't include the 'improved', 'stayed the same' and 'worsened' parameters. They were only measured when comparing respondents' pre-test scores to their post-test scores. The ultimate goal of the program was to ensure that growers go away with knowledge that they will apply on their produce operations and subsequently improve their application of on-farm good agricultural practices, positively impacting the overall quality of the produce consumed by the public from a microbiological standpoint.

The module, 'Developing a Food Safety Plan', was successfully created and piloted to 40 fruit and vegetable growers who had previously attended a core GAPs class. The structure of the module focused on two different types of audits, the standards of each audit type, and reviewed content that should be included in food safety plans if growers want to be compliant with each specific audit (see PowerPoint slides below).

-Your farm food safety plan needs to be tailored to your farm and your farming needs

-Don't make practices harder than they have to be!

-A plan that fits well with your farm should be a help, not a hindrance.

Key: USDA GAP/GHP & Harmonized Standards

Color-coding was used to specify which audit and what audit standard pertained to each specific statement within the food safety plan examples. The 'Mock Recall' slide shows how the color coding was utilized during the presentation.

Mock Recall

-A recall is the ability to remove product from the marketplace once it has left the operation's control

-A mock recall with written procedures should be established and proven effective (G-2) (FO 1.7.1, PH 1.7.1)

-Perform a mock recall at least annually, which should include the trace back, trace forward exercise and should be completed as stated in the program and in compliance with applicable regulations (FO 1.7.1, PH 1.7.1)

Beneficiaries

The core GAPs class was developed in a manner that attracted a wide array of participants who benefitted from the course. One thousand forty-six produce industry stakeholders attended one of the forty-two classes delivered throughout the state during the two-year period of funding. Each of those 1046 attendees learned about risk assessment and risk reduction on a produce operation, which positively impacted each of their customers indirectly via increased grower knowledge on good agricultural practices. Conventional and organic growers invested in the future of the produce industry wanted to understand on-farm food safety practices and ways to assess the risk of pathogen contamination at a grower's operation. Farmers with unique production methods such as those of urban farmers, or Amish horse-powered farms, learned new and creative ways to improve food safety while maintaining their way of life. Farmers' market managers and vendors sought methods to implement GAPs at their market while maintaining competitiveness. Produce auction managers and growers discovered ways to improve food safety practices at the auction barn. Buyers who purchased produce from GAPs class participants benefitted from retailing/consuming

products raised by farmers that understood the importance of reducing the risk of pathogen contamination.

Lessons Learned
The FSMA produce safety rule was not made 'final' until the funded project period transpired. The OSU FVST informed all program attendees of the proposed state of the rule and that standards mentioned within the curriculum could change. The foundational content of the program, on-farm risk assessment and risk reduction, remained the same throughout the life of the grant.

Another factor that impacted the objectives was the difficulty in introducing new course options to stakeholders in a state where "the GAPs class" is what produce auction managers, farmers' market managers, and growers know and often seek. With the 3-hour core GAPs class being in high demand throughout Ohio, it was challenging to promote the 'Developing a Food Safety Plan' module. The pilot program was accepted and appreciated, but the growers in attendance were required to go to that particular advanced class, when the rest of Ohio's produce industry insists on grower participation in the 3-hour core GAPs class. After encountering this supply and demand obstacle, the Program Coordinator created a condensed Recall Preparedness factsheet distributed during core GAPs classes to accomplish a 'retrofitted' objective.

An evaluation was mailed to class attendees after the growing season instead of pre- and post-tests being distributed before and after each class. The evaluation contained a series of questions with responses measured by 'strongly disagree-strongly agree' and 'yes/no'. The rationale behind this objective modification was due to determining true program effectiveness. The Program Coordinator wanted to collect data from growers to gauge how the program impacted their on-farm food safety habits, which cannot be measured in a pre-/post-test format. The results came back in a manner that enabled the coordinator to decipher if and to what extent the core GAPs program affected the food safety decision-making process at the farm level.

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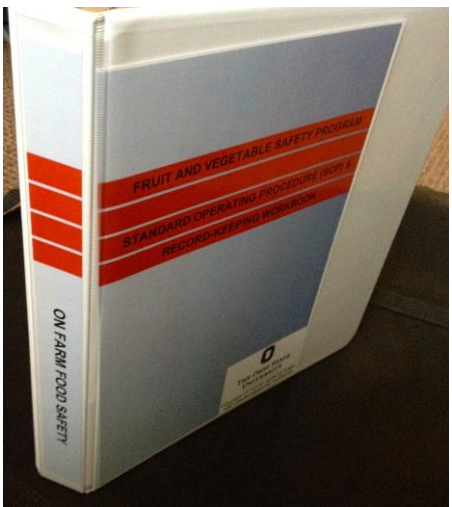
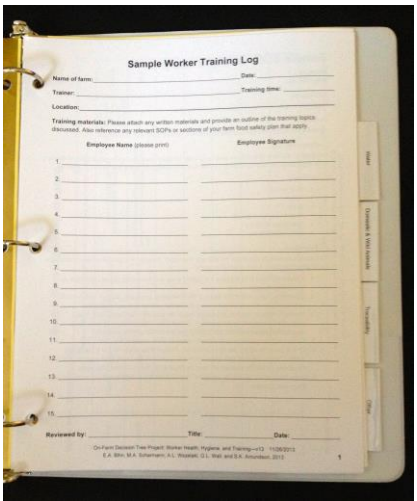
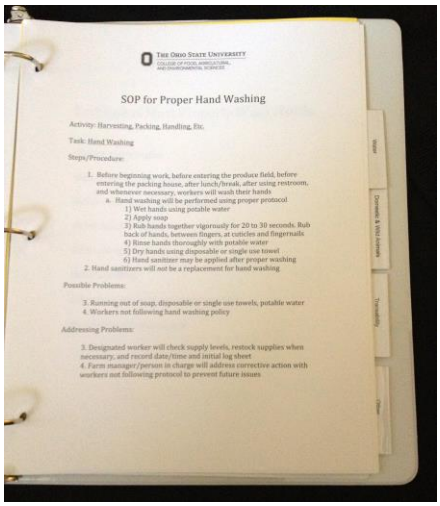
Additional Information
The OSU FVST distributed 3-ring binders and flash drives to core GAPs class attendees.







Knox County (left) and Ross County (right) classes

Project Title: Pickaway County -- Ohio Fresh Foods Corridor Educational Workshops

Project Summary

The Ohio Fresh Foods Corridor is a brand created by Pickaway County, Ohio farmers who wanted to help people experience the connection with their food. The Corridor runs along U.S. Route 23 through Pickaway County and heads north toward Columbus and south toward Chillicothe and Portsmouth on the Ohio River.

This project provides consumers the experience and connection with their food by promoting homegrown entrepreneurship, new investment and the value of Pickaway County's existing strengths in food and agriculture. To further this mission, the Ohio Fresh Foods Corridor brand was developed for Pickaway County around its strengths: prime location along U.S. 23, ample resources and the diversity of agriculture in the area. The project proposal encompassed a series of educational workshops about specialty crops for producers and entrepreneurs, a producer tour to a successful specialty crops hub in Vermont, and further brand building activities.

Project Approach

Pickaway County, Ohio remains above the national average when it comes to unemployment due to a displacement of its historic manufacturing base, an aging workforce and other factors. Despite challenges for some county citizens, one sector of the economy has shone brightly: agriculture. Pickaway County farmers have succeeded both as traditional commodity producers and as specialty crop producers. In fact, Pickaway County is known by many as one of the top areas in the State for farm markets, roadside produce stands and pick-your-own farms.

Workshop recruitment and speaker focus was targeted to current and potential specialty crop producers. The audience included entrepreneurs who are currently specialty crop producers looking to enhance their current operation, row crop or livestock producers looking to diversify, or those individuals who may be considering a start-up operation. Promotional items and communications targeted the specialty crop industry segment as a whole, not a specifically branded/endorsed product. Taste of the Corridor events focused on local foods made with specialty crops. Funding used for non-specialty crop producers were paid for out of other funding sources, mainly through the Pickaway Competitiveness Network's Ag Fund.

The Ohio Fresh Foods Corridor is a strategic approach to building on Pickaway County's strengths in food and agriculture to strengthen the rest of the economy by providing jobs, opportunities and income for residents with traditional and non-traditional agriculture interests.

Competitiveness

Grant funds were used to enhance the competitiveness of Pickaway County as a specialty crop hub. Educational programs provided a competitive advantage for specialty crop producers as they hone their marketing skills, become aware of value-added opportunities and view other successful specialty crop operations. In addition, co-marketing opportunities enhance individual producers' visibility, as well as build perceived value in the minds of consumers about the benefit of the Corridor as a specialty crop hub.

Impact

Specialty crop stakeholders benefitting from this project were producers growing fruits, vegetables, turf and ornamental crops, and a small but growing number of producers interested in value adding to other crops such as hops, bakery input products, et.al.

The educational programs and branding assistance offered through the Ohio Fresh Foods Corridor brand assisted these producers. Producers also benefited by networking with end-users and retail customers.

While it is yet unclear how many individual jobs this created, these efforts enhanced opportunities for entrepreneurs looking to start businesses related to specialty crops. Therefore, it potentially stimulates income and increased potential on-farm income; created positions for business owners and those they employ, and generated increased sales for existing specialty crop producers. Increased sales will inevitably lead to investments in quality improvements and/or labor.

Goals & Outcomes Achieved

Goal 1: Stimulate homegrown entrepreneurship around specialty crop production and processing.

- Two educational workshops were conducted on specialty crop opportunities and marketing in February 2014. A total of 9 participants were involved on February 11 workshop and 13 participants on February 25.
    - Measurable objective was to include 25 producers in educational workshops by September 2014.
    - OSU Extension and Wilt Public Relations worked jointly in planning and executing workshops, including presentations and facilitation.
    - Circleville Herald published photo and cutline distributed by Wilt PR following workshops
    - Evaluations showed:
        - Participants moved from the "Exploring" phase to "Pursuing" opportunities in specialty crops after the workshops
        - Participants gained greater understanding and knowledge of opportunities through the Corridor, their customers, marketing avenues and more.
        - Participants increased their plans to use digital/social communications to reach customers.

Goal 2: Build brand assets around the Ohio Fresh Foods Corridor to connect producers and consumers. And visibility specifically for specialty crops via the Ohio Fresh Foods Corridor.

- Social media posts via Facebook and Twitter, along with website and regional media promotion of the workshops and events. As of this report, there are 3,255 Facebook followers and 80 Twitter followers of the Corridor

- Developed, printed and distributed new rack cards for the Corridor featuring specialty crop producers. Distributed at summer/fall events and in local/regional locations of interest

- Developed, printed and distributed canvas tote bags and plastic farmers market bags showcasing specialty crops of the Corridor. Distributed at summer/fall events and other promotion during the grant period.

- A Facebook photo contest conducted June 24 through August 17, 2014 encouraged users to submit photos of Corridor-area specialty crops.
    - Fans were encouraged to vote for their favorite from seven entries from Aug. 18-22. Winning entry received 10 votes.
    - Winner received $100 OFFC local foods gift basket, with donations coming from local specialty crop producers in conjunction with Pickaway County Visitors Bureau.
    - Messages, advertising and boosted posts on Facebook reached more than 51,000 users.
    - The winner was publicized, along with promotion of the specialty crop producers contributing to the prize through the Corridor's online channels.

- Four feature stories/profiles were created featuring specialty crop producers in the Corridor.
    - Featured on the Ohio Fresh Foods website, social media channels and turned into signage featured at events.
    - Also worked into a slideshow in conjunction with the Taste of Pickaway event.

- Awareness generated by media relations led to OFFC being approached by and featured in a number of media outlets/companies.
    - An Ohio's Country Journal story featured a local producer, and then outlined/discussed the efforts of the Ohio Fresh Foods Corridor.
    - The Chillicothe Gazette newspaper featured photos and cut lines from workshops held earlier in the year, and are watching the Corridor for a follow-up story.
    - Ohio magazine had preliminary talks about forming a partnership and highlighting the corridor.
    - Clear Channel Communications approached OFFC about advertising opportunities
    - WBNS 10TV in Columbus, Ohio approached OFFC about sponsoring its annual "Health and Fitness Expo" (see below)

- In August 2014, Ohio Fresh Foods Corridor Produce partnered with WBNS 10TV to be a lead sponsor of its two-day Health & Fitness Expo in Columbus, Ohio
    - Conversations w/consumers included
    - 6,500 in-person Expo attendees walking into welcome exhibit featured OFFC Produce display
    - 562 attendees signing up for prizes at OFFC display staffed with producers and OSU Extension personnel
    - 116,000 people reached via TV advertising featuring OFFC Produce
    - Tote bags featuring specialty crops of the Corridor were distributed
    - Area producers helped staff the trade show booth and contributed incentives for consumers to sign up to receive Corridor news. Hundreds of qualified leads were secured at the event.
    - The 10TV Health & Fitness Expo helped OFFC far exceed a number of measurable objectives set forth in the work plan.
        - Objective 2: Engage more than 1,000 consumers in conversations
        - Objective 3: Reach more than 50,000 consumers with messages

- A September 2014 a "Taste of Pickaway" local foods dinner brought 212 residents from Pickaway and surrounding counties to a local farm to experience and celebrate the Corridor, and eat a meal comprised of local foods produced by local chefs and culinary students.
    - Four local specialty crop producers contributed food for the event
    - Current state of specialty crops in the county was presented, utilizing signage and marketing materials created throughout the summer.
    - Evaluations show:

        94.4% of attendees said it was a very good to excellent event.

        90.5% percent of attendees had never attended an event like this, with 98.4% saying they would recommend such an event after attending.

        49.6% indicated they would like to participate or sponsor a future similar event

A website redesign/refresh in 2015 simplified the mechanics associated with posting and sharing information about the Corridor for the managers of the project. Metrics for the updated website are not available as of the final report due to the official launch of the website happening after the final grant reporting deadline. The site officially re-launched in early January 2016. It streamlined the opportunities to promote the Corridor and associated it with social accounts, and provides enhanced ability to showcase the Corridor in accordance with today's web standards including:

Ability to access and use on mobile devices
Enhanced and interactive map of farms, stops in the Corridor
Opportunity for users to submit their favorite farms/stops in the corridor
Sharing of facts/information about Pickaway County agriculture
Profiles/features about farmers of the Corridor

- The billboard has remained throughout the life of the grant, and remains in place today. The two-sided sign is in a place where 27,200 passengers traveled both directions along S.R. 23 every 24 hours. Over 29 million passengers have been exposed to the messaging on the billboard over the course of its lifetime. The billboard also was the starting point for the outreach from WBNS, Channel 10 TV station to Ohio Fresh Foods Corridor in 2014, which prompted a large presence by the corridor at the Columbus Health & Fitness Expo. This specific goal and outcome was not in the grant plan/proposal, but transformed and greatly enhanced the activities and recognition of the corridor and specialty crop producers.

Beneficiaries

The beneficiaries of the project are the 19 current farm markets, food stands and vineyards, as well as the 500+ residents of Pickaway County engaged in other aspects of agriculture. One of the bonus benefits of this project is that while it focused on connecting consumers and producers through the Corridor, it also provided an opportunity to educate consumers about the more traditional aspects of agricultural production. The Corridor is not only a place to experience the

connection with your food on a local basis, but it is a key to getting local commodity products to the global marketplace.

As a result of the activities associated with this grant, the Corridor now has the infrastructure, networking and resources in place to increase its value as a source for increase agriculture-related economic development in the Pickaway County. Future opportunities for these beneficiaries through the Corridor may include:

- Opt-in e-Newsletter for consumers
- Updated marketing/promotion
- Membership-based co-marketing opportunities
- Ongoing Taste Events
- Continued production of content/stories featuring specialty crop producers
- Continued regional media outreach
- Opportunities for additional regional promotion and participation to be explored in conjunction with Pickaway County Visitors Bureau

Lessons Learned

Additional opportunities presented themselves as the Corridor expanded its reach through initial efforts as a result of activities tied to grant funding. This included the opportunity to participate as a highly-visible sponsor at an annual large-scale health and wellness exposition attended by the Corridor's target demographic. As a result of capitalizing on such larger opportunities, in addition to factors beyond the Corridor's control, some smaller scale project objectives were not reached, including the scheduling of additional workshops and the producer tour to Vermont.

However, the reach and impact attained through these larger opportunities as a result of grant-funded activities propelled the Corridor to higher visibility and recognition than anticipated at the beginning of this project.

Grant-funded activities also allowed for the Corridor to expand its branding and marketing efforts online in a way that meets and exceeds expectations of today's web consumers.

The major lesson/takeaway from this is that Corridor representatives should remain flexible and proactive with new opportunities that developed as added benefits of the grant-funded activities, rather than working "inside the box" as was outlined at the outset of the grant distribution.

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Project Title: OPGMA -- Food Safety Education

Project Summary

The stated primary goals of the Ohio Produce Growers & Marketers Association (OPGMA) were to promote consumer and processor satisfaction, environmentally friendly practices, business success, and the provision of fulfilling career opportunities for family and employees. These goals were accomplished though premier innovative educational programs, a legislative presence, and cooperation among members. Continuing to incorporate a Food Safety Educational Track at our January annual conference, we created awareness and educated specialty crop growers of the changing food safety industry. Based on previous year's feedback we were also able to redesign some of our core programs to increase the comprehension of the important principals of good food handling practices. The educational classes varied from year to year to offer a broader spectrum covering food safety needs. Because our annual tour in June is at various locations/regions throughout the state, we have been able to reach a broader audience at this venue. OPGMA's continued emphasis food safety education, encouraging the adoption of food safety procedures and certification efforts, and the cooperation with others with similar priorities were consistent with these goals.

The specific goals supported by this grant continued efforts to support the vitality and growth of the Ohio produce industry. They were:

1. Expand the number and scope of food safety educational opportunities to address the needs of both large and small, novice and experienced, and gage intended implementation.
2. To provide Ohio produce growers the opportunity to hear directly from FDA its goal for protecting the safety of our fresh produce supply and instilling greater consumer confidence through the FSMA and how FSMA will impact the practices of Ohio produce growers of all sizes and scope.
3. Cooperate with others involved with food safety research and education by providing a venue for the educational efforts and/or making our stakeholders aware of the opportunities that they offer.

Project Approach

The tasks for this project were outlined by quarter and all tasks were accomplished each quarter. The project focused only on the food safety efforts of specialty crops.

Identifying, contacting and confirming the food safety speakers for the 2014 OPGMA Congress provided the program to include food safety research and outreach presentations of other Ohio academicians involve in food safety efforts. A program was printed to include food safety promotional material as well as a food safety articles were printed in the OPGMA Today newsletter. Electronic links were included to food safety news and updates which are universally available. Food Safety sessions were offered at no registration fee to any Ohio produce grower or industry professional. The entire Food Safety educational track was presented at the OPGMA annual conference. 70% of the attendees reported they would implement what they learned in

these sessions in their business. Overall, the program content was considered timely, relevant, and necessary knowledge. Article in OPGMA Newsletter "OPMA: You've Got Questions: I've got Answers" by Dr. Karl Kolb. Electronic links via our website www.opgma.org.

The 2014 OPGMA Summer Tour & Field Day is another educational program included in this grant. All speakers were contacted and the program was created. Articles were also included in the OPGMA Newsletter "Get Serious about Food Safety" and "Ohio Produce Marketing Agreement: We did it!" both by Dr. Karl Kolb. Electronic links were added to our website at www.opgma.org. A session was also held at the OPGMA Summer Tour that focused on OPMA update and was facilitated by Michael Geary.

Goals & Outcomes Achieved

The Ohio Produced Growers & Marketers Association's (OPGMA) Food Safety Education program served to provide specialty crop produce growers, handlers, and other specialty crop industry professionals with instruction that could preclude food safety lapses. The goal was to increase consumer and processor satisfaction, environmentally friendly practices, business success, and the provision of fulfilling career opportunities for family and employees that consume and grow specialty crops. These goals were accomplished through premier innovative education programs, a legislative presence, and cooperation among members.

The 2014 program emphasized formal education sessions aimed at minimizing potential consumer health and specialty crop producer financial risks in the following areas:

- Support for efforts to reduce or mitigate risk for specialty crop producers.
- Implement programs or projects that provide outreach and education on the importance of the industry with regards to Ohio's economy, food safety of specialty crops.
- Enhancing food safety and related areas.
- Leveraging investment of previously awarded grants to take project to the next level.

1. Seven Food Safety sessions (14.5 total instruction hours) were offered at 2014 OPGMA Congress, Dates: January 20-22, 2014. Grant-related expenses consisted primarily of speaker-related costs for food safety speakers and ancillary expenses for program development and promotion.
2. A total of seven email blasts were sent to 1,600 growers in Ohio and surrounding states, all of which mentioned the food safety program at the OPGMA Congress and two that were specifically devoted to the food safety program. In addition, food safety program advertisements were placed in two of the quarterly OPGMA Today newsletter. Finally the food safety sessions were featured in the Congress program and on signage at the conference itself.

3.Titles, speakers, attendance, average attendee understanding of subject material before and after session (5 to 1 scale with 5 = expert knowledge level), and percent of session respondents that plan to take action in the next 18 months based on material presented. 100% of survey attendees stated their knowledge level had increased due to the sessions provided and 70% of

the attendees reported they would implement what they learned in these sessions in their business.

Title	Speaker	Attendance	Knowledge Level Before	Knowledge Level After	Action Planned (%)	Rank (out of 52)	Number of Respondents
FDA FSMA changes to OPMA (1hour)	Karl Kolb	54	2.5	3.9	55	38	32
Environmental and Product testing - how to set up a sampling program (1.25 hour)	Kiley Harper-Larsen	153	2.9	3.6	74	44	23
HACCP - when is it necessary? (1.25 hour)	Kiley Harper-Larsen	26	2.4	3.5	60	46	22
Getting Real with Food Safety (1 hour)	John Eades	24	3.7	4.1	67	24	11
Produce Safety: Keeping the Crap off the Crop (4 hour)	Betsy Bihn, Gretchen Wall	61	3.5	4.4	81	30	29
You Are Facing A Food Safety Recall – What Now? (3.5 hour)	Larry Goodridge, Michelle Danyluk, Jeffrey LeJeune, Janet Buffer, Benjamin Chapman	31	3.3	4.4	67	22	11
FSMA's Preventative Controls Rule	Larry Goodridge, Michelle	31	2.7	3.8	70	44	22

– What It Means For You (2.5 hour)	Danyluk, Jeffrey LeJeune, Janet Buffer, Benjamin Chapman						

3. 2014 OPGMA Summer Tour & Field Day Food Safety Update. Date: 6/25/2014. Speaker: Michael Geary. Attn: 225
4. Food safety articles published in the OPGMA Newsletter (published four times a year).
    a. *Get Serious About Food Safety*. Dr. Karl Kolb. Winter, 2014.
    b. *OPMA: You've Got Questions; I've Got Answers*. Dr. Karl Kolb. Spring, 2014.
    c. *Ohio Produce Marketing Agreement: We Did It!* Dr. Karl Kolb. Summer, 2014.
5. Due to inclement January weather, the goal of 850 attendees was short by 10%.

Beneficiaries

The education facilitated by the grant serves as a foundation for understanding food safety in general and the kinds of measures and strategies needed to become certified. So, not only did the grant help avoid the economic loss associated with food borne illnesses but it helped create economic opportunity for some specialty crop produce growers. The economic opportunity cannot be determined at this time. However, we do know the industry is still recovering financially from past food safety issues. It is believed that this training will help avoid economic loss from issues like in the past. A general estimate could potentially be millions of dollars to the specialty crop industry over several years. We know 70% of participants plan to implement what they learned into their food safety procedures. We also know that 1600 specialty crop growers were notified of these programs. The beneficiaries of this effort were Ohio specialty crop growers and consumers. While our program was focused on specialty crop producers and handlers, the general public is the ultimate beneficiary of the project. By educating handlers and producers on the seriousness of the proper handling of specialty crops, this will prevent financial loss to the entire specialty crop industry from growers and handlers to distributors, retailers and consumers. The consumer needs to have more confidence that the food they purchase (raw or processed) has been handled in the safest manner. Food sellers (markets grocery stores, etc.) also benefitted because they can offer a better product to their customers and therefore increase their sales. Increased sales are difficult to determine but again, we can look at the financial loss from previous food safety issues. Finally, food safety experts (researchers and instructors) advanced their understanding of the needs of consumers, producers, and handlers. Quantification of these beneficiaries is difficult to provide based on the audience we reached and without education to all parties involved which was not the intent or purpose of the grant.

Lessons Learned

While attendance was impacted due to poor winter weather, based on the feedback received from attendees, based on the feedback given by attendees, presented materials were considered timely, relevant, and necessary for effective implementation in their businesses. Overall, the program achieved increases in topic knowledge for the majority of attendees in every session. Furthermore,

the majority (70%) of attendees reported that they would implement what they learned in a session in their business.

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Additional Information
The project was executed by OPGMA under Executive Director, Michael Geary, CAE. In addition to Michael, OPGMA staff involved in the project include: Stephen Carver, Ph.D.; Michelle Gaston, Laura Kunkle, David Savoia, Adriana Quinones, and Scott Leyshon.

Several other parties contributed to the planning of the food safety sessions at the 2013 OPGMA Congress, including:
Jeffrey Lejeune, Ph.D., The Ohio State University-OARDC, Food Animal Health Research Program
Doug Doohan, Ph.D., The Ohio State University, Dept of Horticulture & Crop Science
Karl Kolb, Ph.D., High Sierra Group
Aaron Buurma, Buurma Farms Inc.
Sally Miller, Ph.D., The Ohio State University, Department of Plant Pathology
Peggy Kirk Hall, J.D**.,** OSU Extension Agricultural & Resource Law Program

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Project Title: CIFT -- Season Extension and Increased Marketability of Root Crops

Project Summary
The following information describes the results of the project coordinated by CIFT to review the potential for a mobile hoop house and the impacts on season extension growing techniques. A comprehensive evaluation incorporated the use of a structure for demonstration purposes and data collection, information from buying outlets, and educational opportunities to communicate the value of such a technique.

The interest in and opportunities for the specialty crop industry continues to thrive. This project addressed the (a) development of season extension and sales opportunities, (b) diversification and expansion of production, and (c) implementation of programs that provide outreach and education to the industry. The overarching goal was to provide specialty crop growers with proven production and marketing advantages while offering technical information to accelerate the growth of the industry and capitalize on consumer demand for local and healthy foods. The use of alternative production techniques can extend the growing season and intensify the volume of vegetables produced. The focus was placed on root crops due to a number of advantages with respect to varieties, alterations in performance based on growing technique, storage potential without preservation, and consumer demand.

Project Approach

This project provided growers with the technical information necessary to make business decisions when selecting production techniques. In 2007, CIFT began to demonstrate unheated high tunnels equipped with supplemental low tunnels in year-round production. Through collaboration with researchers and extension professionals, CIFT established models around Ohio. Some have successfully formed profitable business relationships with retailers. The economic advantage is the ability to extend the growing season for local produce and capitalize on the "time value" of specialty crops.

CIFT's on-going demonstration activities were the foundation of this effort. The project focused on selection of cultivars, optimization of storage techniques, and development of business opportunities that emphasize the market for products, particularly root crops.

For the purposes of this initiative, a slightly modified structure served as the foundation for review. The same philosophy as a hoop house will be applied, however, alterations to space and structure integrated. The Eliot Coleman technique for a mobile structure was utilized and serves as the premise for the following results.

Goals & Outcomes Achieved

The mobile greenhouse approach offers a number of advantages. As referenced in "The Winter Harvest Handbook," it allows for winter crops to be started while cover is still applied to the heat loving crops. Upon transition of seasons, the greenhouse can be moved to provide necessary growing conditions for the cold temperatures. A second advantage of the mobile greenhouse is the avoidance of the buildup of pests, disease, and excess nutrients. Growing spaces can be uncovered and exposed to the natural elements of sun, wind, and rain.

Through collaboration with Toledo Botanical Gardens, a mobile hoop house structure was constructed and served as the location for the project. Three main focus areas were applied to the initiative. Activities and results are noted below within each:

A. Development of season extension opportunities

This goal was identifying, demonstrating, and evaluating the production practices as modeled after the mobile greenhouse platform defined by Mr. Coleman.

a. Use of a mobile "hoop house" combining the benefits of season extension with natural production. Direct interactions were conducted with the growers using this mobile approach. Only a few have integrated the mobile component to this point. The tours and educational sessions were designed to increase utilization by demonstrating the benefits. The unit applied to this effort did experience improved quality and flavor of crops as did one other location in which the practice was implemented.

b. optimize the storage advantages for increased sales potential and distribution

One of the appealing aspects of production under this environment is the impact on flavor profiles with certain crops due to the exposure to cooler temperatures. This was the initial goal for the project in an attempt to produce a "sweeter" carrot. Not only would the crop have economic advantages correlating to time of harvest but potentially enhanced flavor appeal to consumers, particularly children. In August, the first trial of six varieties of carrots was seeded followed by another planting in Sept resulting in a December harvest. The seeds were obtained from Dr. Simon of the USDA ARS Vegetable Lab and the end product returned to him for technical evaluation. The lab measured sugar content associated with the first rotation. In mid-December, the "Napoli" carrot, of which Eliot Coleman recommends, was planted for comparison. A portion of the seed was placed under six mil plastic low tunnels and another segment under Argoban row cover for contrast.

There were some issues associated with timing due to delays in the construction of the mobile structure; therefore, the first crop didn't reach full maturity or production capacity. For that reason, it was also assumed the typical impact on flavor was not achieved. This was further validated by the tests at the laboratory showing

minimal changes in sugar content. In the second year, the approach was replicated with the optimum timing applied. This time, there was a notable distinction in the "sweetness" and seemed to further confirm the potential for an even more niche product. The target of at least 75% indicated an improvement in performance and flavor was achieved through the operators of the demonstration unit and secondary outlet.

In addition, a trial of "Crunchy Crimson" radishes was also seeded. There were two varieties of radishes planted (Crunchy Crimson & Crunchy Royal) in the spring for evaluation in terms of sweet characteristics noted upon harvest. Product was shared with an interested company searching for a mild and potentially sweet alternative to their current supply. In theory, it was anticipated that cooler temperatures may again impact the flavors of the crop. In this trial, only a slight flavor distinction was achieved. Additionally, there were two varieties of potatoes (French Fingerling & Kennebec) planted outside the hoop house using different methods i.e. halved and whole potatoes to monitor performance.

A portion of the project was to evaluate the storage potential for root crops. The onions (white, red, and yellow) held up well in a cool, dark location and remained firm until early June. The potatoes were starting to show deterioration in March and discarded. Another crop, garlic, was planted within and outside the hoop house structure to further evaluate root crop potential.

Temperature and Relative Humidity Rh (%) were collected in the structure to be able to witness the availability of heat and moisture levels during the day. In addition, ventilation of the structure was provided on daily basis when the relative humidity was high. It is critical when producing a crop during this time of the year to monitor the above mentioned conditions. Sun on a cold day can still greatly impact the temperature under the cover and without appropriate attention, diseases, molding, and numerous other negative results will be recognized. As critical as the timing of the planting, monitoring and management throughout the growing stages is imperative.

Finally, outside of the hoop house the plots that had tillage radish as a cover crop in the previous season, were tilled and planted with tomatoes, peppers and root crops; such as turnips, beets, radishes and collards. The tillage radishes were successful in breaking down the compacted soil and leaving a loose and nutrient rich growing medium. Ground that was difficult to apply a shovel to became manageable for any type of planting. This approach was incredibly valuable in

improving the quality of the soil, changing the composition, and increasing the levels of Potassium and Magnesium in the area in which these crops were being grown.

B. Diversification and expansion of production

This goal included evaluating the yields, quality, and performance of the crops.

a. comparative evaluation of the product to that available on the market
b. collect consumer feedback on the flavor profile of winter "sweetened" carrots
c. impact as compared to local, regional production of root crops

Beyond the scientific review, a consumer panel was convened to sample the varieties and provide comment on purchasing preferences and flavor profiles. Several volunteers participated in the tasting and provided insights as to the preferences associated with color, taste, texture, size, quality, and more. Due to the challenges related to timing, not many could distinguish the "sweeter" flavor profile anticipated with the crop. The product was still favorable, yet, not the anticipated results. Modifications to timing in the next planting enabled another attempt for comparative analysis. Additionally, the ARS lab results were received and indicated that due to the small size of the carrots the sugar content had not accumulated as expected.

The carrots were harvested and a tasting was conducted to compare commodity variety to the Napoli. More than 20 consumers participated in the first round and the majority favored the flavor of the Napoli to what was available at the farmers market. A similar approach was taken with a chef and a classroom of sixth graders at Wildwood Elementary in an effort to explore preferences. All were favorable but varied in the degree to which "sweetness" was recognized.

A few quotes from the students regarding the Napoli versus market carrots:

- The carrot was sweet, juicy, and had lots of flavor. Never tasted a carrot like that.
- It tasted like ketchup
- That one was better and "gooder"
- It had a sweeter taste
- In my opinion, I liked it because it was dry but a little juicy
- Tasted a little odd at first but got better and didn't really feel like a carrot
- Had more flavor
- I could taste juice and it was sweet and good

The carrots were harvested on 3/27/15 and the samples prepared for taste tasting on 3/31/15.

Table 1. Yields of Carrot Varieties tested

'Napoli' carrot

Seeding Date	Yield (lbs)
8/1/2014	12 oz
8/8/2014	2 oz
8/15/2014	1 lbs 10 oz
8/22/2014	3 lbs 2 oz
8/29/2014	2 lbs
9/5/2014	3 lbs 12 oz
9/12/2014	1 lbs 5 oz
9/19/2014	6 oz
9/23/2014	10 oz
‘Rainbow’ carrot	
Seeding Date	Yield (lbs)
8/1/14	2 lbs 3 oz
8/15/14	2 lbs 12 oz
9/23/14	7 lbs 6 oz
‘Deep Purple’ carrot	
Seeding Date	Yield (lbs)
8/1/14	1lbs 10 oz
8/15/14	1lbs 10 oz
9/23/14	3lbs 4 oz

The best yields with ‘Napoli’ Carrot were achieved on seeding in late August and early September. The yields recorded were small compared to the trials conducted the previous season when the crops were covered in the low tunnels inside of the hoop house.

C. Implementation of programs for outreach

This goal was accomplished by the combined efforts of the partners and industry.

a. educational sessions with growers
b. creation of an advisory committee comprised on retailers, wholesalers, foodservice operators
c. results shared with contacts such as Maumee Valley Growers to Ohio Produce Growers and Marketing Association.
d. tours of the demonstration model for growers

Projects such as this are only as strong as the information shared. Equally, responsiveness is increased when there is something to see, touch, and taste as compared to documentation to read and analyze. Keeping this in mind, several approaches were applied towards sharing lessons learned with growers, community members, retailers, wholesalers, and consumers. CIFT participated in the annual Plant Sale hosted by TBG in an effort to educate consumers on the project and the methodology of season extension production. There were over 400 attendees to the Plant Sale and 23 growers for the Maumee Valley Grower Association Tour. Several hundred people visited the location and were given tours of the structure. These are all consumers interested in production either through a small independent garden, a community initiative, or an urban farm operation. Equally, media coverage was gained and increased awareness was achieved by local growers. The Maumee Valley Grower Association conducted a tour during a meeting of numerous regional greenhouse growers in order to showcase the approach as compared to the standard structures used for horticultural production. The participants have extensive knowledge on growing crops and managing plant diseases, nutrients, and preparing for sale. However, limited exposure to food production or integration of managing an approach that capitalizes on temperatures or niche market opportunities.

In addition, information was presented to more than 250 growers at a “Farm to Table” event featuring local efforts of food production. Increasingly local food discussions struggle with availability and access in the off-season. This type of production practice provides one solution to such a challenge. The selection of crops is limited, yet the market potential is sound for advancement and a purchasing base has been established with interest in such items. Details on this project were also included in a presentation to the Ohio Nursery and Landscape Association with over 75 growers in attendance while updates were posted on social media outlets to encourage involvement and educate growers.

- CIFT participated in the Seed Swap event hosted by Toledo Grows and shared insights on the mobile structure with more than 700 attendees. In addition, information was presented to several community groups including Sofia Quintero Art and Culture Center. The interest from urban communities gained momentum due to the potential for tours and targeted discussions. In order to capitalize on this area of emphasis, certain hurdles needed to be addressed. A presentation was made to the City of Toledo as a means to educate policy makers on the economic potential hoop houses encompass and encourage support in expanding the inclusion of these structures in the city. No Specialty Crop Block Grant dollars were used in this capacity. Funding from other non-federal sources was applied to the efforts, only referenced in this report to demonstrate a response to challenges involving expanded efforts in the urban epicenters. Federal funds were not applied to this activity and the source of funding was supported by other non-federal sources. Adjustments were requested for the permitting process in order to streamline the independent efforts and enable increased production within neighborhoods without access to fresh products otherwise. The off-season capabilities were an added bonus. Potatoes, garlic, carrots, and other crops were held after harvest to monitor quality and performance. The onions (white, red, and yellow) held up well in a cool, dark location and remained firm until early June. The potatoes were starting to show deterioration in March and discarded. The onions maintained flavor while held in storage. With regards to the carrots, they were stored in a cool, dark storage room with natural climate control (no electric cooling or heating applied). These were placed in

storage January to April and the color remained consistent as a bright orange. The texture the first three months was crisp and would still snap when broken and the flavor was sweet. However, by month four, the carrots became soft and rubbery with a slightly bitter flavor. The target of 90% of the crop as consumer ready after storage at time of harvest was not achieved with every specialty crop. The onions did meet this goal while the potatoes and carrots were slightly less appealing after a long storage. Each still could be used within recipes but not as a stand-alone item.

All of the above efforts were designed to communicate and educate various audiences on the potential and value associated with any size of structure that is utilized in a fashion for optimum production capacity. As a means to tie it all together, a featured program was delivered wherein the region was able to hear directly from the inspiration and model in which efforts were replicated. In April, Clara Coleman shared insights on her experiences on season extension to 78 growers, toured the structure to offer suggestions and validation to the practices, and offered additional insights into the project. This was invaluable to those who have envisioned season extension potential in the area as well as served as confirmation of the rewards of this innovative approach.

Beneficiaries

The target audience for this initiative was broad. First and foremost, specialty crop producers were provided information and remained engaged in this project in order to encourage expanded production potential. The limitations associated with traditional growing seasons have long hindered growers in competing with crops produced in more favorable climates. Implementing a cost effective approach to growing products in a time period generally recognized as restricted or inefficient is a tremendous opportunity.

More than 20 urban growers and 60 regional growers benefited from the demonstration of this approach to season extension production. Over 500 consumers and gardeners interested in local food accessibility in the off-season were exposed to an option that could be applied on any scale; personal to commercial growth. Information continues to be shared with growers and consumers to further expand the knowledge and engage more operators in this practice. Below are additional presentations conducted and number of attendees:

Wood County Plant Exchange-25
Lucas County Main Library -15
Toledo Grows Annual Seed Swap- 150
Sophia Quinterro Arts & Cultural Center - 30
Lucas County Board of Development Disabilities Adult (Environmental Group)-21
Lott Industries - staff and Director- 4
Loardes College Educational Consortium for Environmental Concerns -32

Secondly, consumers and buyers (retailers, wholesalers, foodservice venues, and more) are provided locally produced product. The interest in local is unmatched and consumers are validating the desire at premium pricing. Institutional buyers are capitalizing on the inclusion of local as a marketing advantage. Finally, another unexpected benefit has been the ability of communities to

produce food for longer periods of time, thereby, improving food access in areas where this is frequently limited.

Lessons Learned
One of the first challenges was a familiar one; the weather. Inclusion of a structure didn't immediately resolve the impacts of Mother Nature. There were delays in getting crops in the ground at the desired time frame. These crops would have been planted and then covered at a later date by the structure. Optimum growth was limited when planting dates are compromised based on these factors. In order for this type of approach to be productive, crops need scheduled closely. Another challenge related to the location in which the unit was positioned. Improper drainage coupled with excessive water running off the structure caused for drowning or rotting of crops. A secondary factor in placement is the proximity to buildings or trees as to avoid shading. A hoop house can provide protection against cooler temperatures yet as much light as possible is necessary for growth. Finally, similar to any other growing environment, rodents and pests are inevitable. Providing a warm environment coupled with a wealth of greens and root crops entices any creature searching for a comfortable place during the harsh weather. This certainly causes crop loss and impacts quality of products. Not unlike any other technique or production approach, just a noticeable impediment. Avoidance of limiting factors will increase probably of success.

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Additional Information
The most valuable method of communicating the project was to see the structure first hand and explore the crops in various growing stages. Fortunately, due to exemplary partners, this was possible and tours were conducted for a comprehensive overview. Training efforts were conducted at the location to highlight and demonstrate the practice. Supplemental resources further communicate the initiative.

Project Title: OFA -- Keeping the Interest in Gardening Alive

Project Summary
Gardening interest, and purchases, among 18-50 year-olds is much less than for those who are more than 50 years of age yet few studies have directly addressed the low interest in gardening among young adults. The objectives were to (1) identify inhibitors to gardening among younger populations, (2) provide guidance to garden retailers on how to reach this population through marketing messages, events, and activities, and (3) ultimately grow the gardening consumer base through helping Ohio nursery retailers and independent garden centers remain relevant to younger aged potential consumers and grow their business. Objectives were achieved by capturing (potential) consumer input from persons aged 18-50, with special emphasis on persons aged 18-29 (Gen X) and 30-50 (Gen Y). After synthesizing the consumer input, we sought the input of a

professional marketing & advertising firm to help develop four potential marketing campaigns. These campaigns were offered to industry collaborators at no charge and with some training to implement in 2014 and 2015 plant selling seasons. Through personal visits, telephone conversations, and online webinar participation, we facilitated the impact assessment of the marketing campaigns for the industry collaborators. While not all campaigns had positive outcomes, the collaborators were unanimous in the positive impact that most campaigns had on their sales and the firm's ability to recruit some younger aged consumers. Most business collaborators have retained at least some of the adapted campaigns and continue to utilize the findings. In addition, an e-book and video series were created and are offered at no cost online for other nursery firms, retail greenhouses, and garden centers to utilize. The "Plant Something!" campaigns was evaluated in Ohio and considered to have a positive impact on gardening purchases.

Project Approach

AmericanHort coordinated the activities and had great project oversight and project leadership from Carol Miller (Meister Media), Susan Hogan (formerly at Emory University) and Bridget Behe (Michigan State University). With the assistance of industry professionals, the team was able to collect consumer input from a variety of Ohioans to achieve **the first objective which was to identify inhibitors to gardening among a younger population**. After collecting and synthesizing consumer input, we sought the insight of Lynne Switanowski (Creative Business Consulting Group) to help develop four recommended marketing campaigns. These were: (1) Helping Your Garden Grow – We Guarantee It; (2) Grow Up Gardening; (3) We LOVE Where You Live, Too!; and (4) How Does Your Garden Grow? These campaigns were developed to specifically address some barriers to plant purchasing which included (a) reluctance to buy a product where success was considered "luck" or good fortune, (b) an interest in gardening imparted during childhood but not continuing into adulthood, (c) lack of awareness of local independent garden centers despite a high motivation to buy locally produced products, and (d) an high interest and participation in social media to facilitate sharing success and enjoyment with other products.

Along with the campaigns, five strategies were developed to implement them: (1) Create customer-loyalty programs that showcase how garden centers meet today's consumer needs and engage customers to keep coming back for more during the entire season. (2) Showcase "new" in-store merchandising with an emphasis on how-to projects, use targeted messaging, and explain how to complete a project both visually and in signage. (3) Use visual imagery in messaging which includes younger people and technology use. (4) Create an integrated marketing communications strategy to increase social media marketing as well as integrate messages across media platforms (TV, newspaper, magazines, emails, direct mail) as well as between the messaging and in-store experience. (5) Conduct community or out-of-store events where the business was integrated with others and in the community.

Figure 1. Sample imagery for marketing campaign #1

Figure 2. Sample imagery developed for marketing campaign #3.

Objective 2 was to provide guidance to garden retailers on how to reach this population through marketing messages, events, and activities.

With the assistance White Oak Garden Center (Tom Higelman), Graf Growers (Lisa and Karlie Graf), and Pettitis (Beth Bassin), Wilson's Garden Center (Ned and Mitzi Wilson), and Rhoads Garden Center (Carly Neff) the research team facilitated the adaptation of the marketing campaigns to meet the needs of the business. Meister Media developed some images that were customizable by each garden center for use in the store and online and made those available at no cost. Two webinars with the collaborators were held to familiarize them with the consumer input and marketing campaigns. The collaborating garden centers each adopted 1-2 of those campaigns. The research team met in-person and/or by telephone with each garden center twice and held two online webinars to explain the campaigns to collaborators and provided suggestions, advice, and facilitated how to implement the campaigns in their individual stores.

The third objective was to grow the gardening consumer base through helping Ohio nursery retailers and independent garden centers remain relevant to younger aged potential consumers and grow their business.

We had follow-up visits and telephone conversations with the retailer collaborators through the implementation of the campaigns. Success measures were documented in those visits and conversations. In an online survey conducted by Meister Media, we found that 35% of the respondents had participated in the Plant Something! campaign and that there appeared to be a positive impact from participating in the campaign.

Goals and Outcomes Achieved
All three of the projects objectives were achieved: (1) identify inhibitors to gardening among younger populations, (2) provide guidance to garden retailers on how to reach this population through marketing messages, events, and activities, and (3) grow the gardening consumer base.

Each of the five participating garden centers provided training to their staff as well as surveyed their customer base during this project. Surveys questions and responses are outlined below.

The first point of contact at retail is always the employee which is why the garden centers focused on training their staff. Each employee is trained by department. Mystery shoppers are used at one garden center to gauge the service of the employees. Greeting customers and educating them about special offers are done at most of the centers. Management coaches employees through employee performance reviews as necessary. One center assigns a mentor to new employees until they are fully trained. The Profitivity Training Card Program works wonders for one center. All of the goals and expectations are outlined up front.

The garden centers strategically tried to grow their consumer base through social media, advertising, and direct mail pieces. Some marketing messages sent to customers included:

- Helping your garden grow…we guarantee it!
- Real foodies grow their own food
- Homegrown and healthy
- Loyalty offers of 20% off plants

- Birthday postcard for a discount

The centers also included services to gain customers:

- Garden design
- Landscape design
- Tree planting
- Landscape installation
- Yard maintenance
- Delivery
- Repotting container gardens
- Holiday decorating and lighting

OH Garden Centers	Sales under $1 mill. 18% (2)	Sales $1 - $3 million 63% (7)	Sales $3 - $5 million 95 (1)	Sales more than $5 mill. 9% (1)
Wilson's Garden Center		X		
Rhoads Garden Center	X			
Graf Growers		X		
White Oak Gardens		X		
Petitti Garden Center				X

OH Garden Centers	Profit 0% - 2% 40% (4)	Profit 3% - 5% 20% (2)	Profit 6% - 9% 20% (2)	Profit 10% - 12% 10% (1)	Annual Inventory Turns
Wilson's Garden Center		X			3.7
Rhoads Garden Center	X				7.6
Graf Growers	X				7.6
White Oak Gardens		X			6.0
Petitti Garden Center				X	4.3

OH Garden Centers	Less than 1,000 customer emails 0%	1,000 – 5,000 customer emails 45.5% (5)	5,000 – 10,000 customer emails 27.3% (3)	10,000 – 20,000 customer emails 9% (1)	More than 20,000 customer emails 18.2% (2)
Wilson's Garden Center			**X**		
Rhoads Garden Center		**X**			
Graf Garden Center		**X**			
White Oak Gardens		**X**			
Petitti Garden Center					**X**

OH Garden Centers	TV 36.4% (4)	Radio 63.3% (7)	Newspaper 36.4% (4)	Billboard 27.3% (3)	Direct Mail 100% (11)	Email Campaigns 90.9% (10)	Digital Advertising 27.3% (3)	Sponsoring Community Events 81.8% (9)
Wilson's	X	X			X	X	X	X
Rhoads					X	X		X
Graf		X	X	X	X	X		X
White Oak		X			X	X		X
Petitti	X	X	X	X	X	X	X	X

OH Garden Centers	Facebook 100% (11)	Twitter 63.3% (7)	LinkedIn 18.2% (2)	Google+ 27.3% (3)	YouTube 54.5% (6)	Pinterest 81.8% (9)
Wilson's	X	X		X	X	X
Rhoads	X	X				X
Graf	X				X	X
White Oak	X	X		X	X	X
Petitti	X	X	X	X	X	X

The goals were to (A) increase patronage of younger (ages 18-35) people by 10% and (B) to increase sales of retail garden center collaborators by 5%.

Goal A: Increase patronage of younger customers by 10%.

We used several examples of success measures and extrapolated them to Ohio plant retailers to demonstrate the impact and return on investment. The 2014 Census of Horticultural Specialties[1] reported that there were 778 horticultural operations in Ohio with retail sales of $79,036,000 (+/- 2.9%), or approximately $101,589 in annual revenue. The National Gardening Association[2] reported that average annual household spending on gardening was $162 in 2014 ($317 in total expenditures minus $155 spent on lawn care). Thus it was assumed a customer count of 627 per store ($101,589/$162). These figures were used as the basis for our extrapolation.

One retailer participated in a Bridal Open House event and introduced their business to 300 potential customers at that event. They had not ever participated in the event prior to the project. Of the 300 individuals newly introduced to the business, 125 of them were in the 18-35 age bracket. Eight of the individuals turned into wedding customers (average sale of $500) and 4 became regular customers (average sale $40 each of three times per year). If 25% of the Ohio plant retailers (195) participated in a wedding fair and captured 8 new customers for a wedding event with an average sale of $500, the total increase in revenue would be $4000 or an **increase of 3.9% of sales for each plant retailer**. It would also mean 8 new customers plus 12 additional purchases or a net gain of 20 customers or **3% increase in customers** ages 18-35 (20/627).

Another collaborator reported that, "Without the project, I am not sure that we would have seen the value of holding workshops that attracted a younger audience." This plant retailer offered more workshops in 2015 than in 2014 (51 compared to 40). Each of those classes was comprised of 50% of the individuals in the 25-34 year old category. If 50% of the retailers increased workshop

[1] Vilsack, T. and J.T. Reilly. 2015. Census of Agriculture 2012, Census of Horticultural Specialties 2014. Volume 3 (December), Special Studies, Part 3, AC-12-SS-3.

[2] Butterfield, B. and I. Baldwin. 2015. National Gardening Survey 2015 Edition. Williston, VT.

offerings by 25% (going from 20 classes to 25 classes) and each class hosted 20 participants (20 people x 25 classes = 500 or 250 people in the 18-35 age category) they may generate $6250 in additional total revenue per store (at $25/person sales or registration) or **6.1% revenue increase per store.** This would also mean an **increase of 39.8% of customers ages 18-35** (250/627).

Another retailer reported they introduced an online landscape design request service called "Snapshot Gardening." Essentially, this new service permitted consumers to upload images of their existing yard and garden, answer several questions online, and pay $50 for the design. The customer then would come to the garden center to meet with the designer and, at that time, receive a $30 gift card to purchase plants for the design (net cost to consumer $20). They had 28 new customers complete the snapshot design form and pay the $50 cost. Approximately half of them were ages 18-35 years. The new revenue generated was **a 0.5% increase in gross sales** ($560=$20 net x 28). So this retailer **increased customer count by 4.5%** (28/627).

Nearly all of the collaborators have a Facebook page. One retail collaborator indicated that of their 3300 fans, 23% were in the age group 18-34. **This represents an increase of approximately 5% over the percentage of fans in that age group from 2014**.

Goal B: Increase sales of retail garden center collaborators by 5%.

Four of 5 (80%) collaborating retailers indicated an increase in sales from 2014 to 2015 and 3 of 5 (60%) indicated that the sales increase was > 5%. Thus, extrapolating the results from this study to Ohio plant retailers, if we conservatively project that 389 retailers (50%) would adapt the marketing strategies used in the study **50% of them could realize a 5% increase in retail sales**. We could project that a 5% increase in revenue ($5079) for each of the 195 retail outlets in Ohio who would adopt the marketing campaigns would represent a total gain of $990,405 or **increase total retail plant sales in Ohio by 1.25%**.

Beneficiaries

The direct beneficiaries were the retail collaborators and other Ohio retail garden centers which were made aware of the campaigns and adapted or used the campaigns in their marketing mix. The ultimate goal of this study was to increase sales of plants and we have achieved that goal. This project had a positive impact on the number of gardeners, retail sales and the number of plants sold. The specific beneficiaries of the project are the Ohio-owned retail garden centers and greenhouse and nursery growers. The investment of ~$35,000 did lead to at least a 5x return on investment ($8 average price of a plant sold x 22,000 more units) or approximately equate to sales of ~$30,000 for each of the 6 partner retailers. Wholesalers and producers also indirectly benefit in supplying the firms with plants.

Lessons Learned

Young (ages 19-29) consumers have very little interest in communicating to industry professionals about their interest in the product line. It was exceptionally challenging to obtain their input, but it was crucial to the success of the project.

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Additional Information
The e-Books are available online at Meister Media at: www.meistermedia.com

The video series is available online from Meister Media at:
Video 1

<iframe width="640" height="360" src="https://www.youtube.com/embed/Cq2nK-VqO20?rel=0" frameborder="0" allowfullscreen></iframe>

Video 2

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Video 3

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Video 4

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Video 5

<iframe width="640" height="360" src="https://www.youtube.com/embed/YFURlCc5Ftk?rel=0" frameborder="0" allowfullscreen></iframe>

Project Title: ONLA -- Plant Something Campaign

Project Summary
Ohio's nurseries, among the largest agricultural commodities in Ohio, face enormous challenges in the wake of the recession and decline in home building. ONLA received a grant to promote and encourage the production, sale and use of Ohio grown landscape trees and plants through "Don't Just Stand There. Plant Something!" messaging in collaboration with 12 other states (many with funding through the USDA Specialty Crop Grant Program). The Plant Something Program, a broad based marketing and education effort for the public utilizing print, radio, public events, social media, and internet-based technologies to reach the broadest audience across geographical and generational ranges positively impacting sales for retail and wholesale markets. Educating producers and consumers of the environmental, commercial and aesthetic values of landscape plants as well as the value of locally produced landscape plants will have a significant impact on the long-term success of the Ohio nursery industry. The goal of this program is to proactively promote the benefits of trees, shrubs, perennials and annuals through consumer outreach, education, and marketing.

Project Approach
ONLA is uniquely positioned to promote and educate the consumer on the benefits of landscape plants and trees. It is a task that has formed a vital piece of our service to our members for the past 100+ years. As economic conditions improve, enhanced marketing and education will be instrumental in the recovery of the nursery industry. This project serves to enhance the competitiveness of horticulture specialty crops by effective messaging around a unique buying proposition: plants bring intrinsic long-term value to your family, your home, your health, your neighborhood, and the environment that goes beyond monetary worth. The campaign aims to create a groundswell of people motivated to enrich their private and public environments by purchasing these specialty crops.

ONLA has licensed (beginning in late 2012) the usage and adaptation of the successful and award-winning 2009 Specialty Crop Block Grant obtained by the Arizona Nursery Association (ANA). ONLA will leverage these professionally produced materials (created after extensive market research by a professional public relations firm) and our relationships in Ohio to promote the benefits of purchasing and planting Ohio grown plant material. ANA reported a 10% increase in plant sales, month over month, at retail nurseries in Arizona at the conclusion of their first promotional year. Currently, 12 other states have licensed this program, with over half receiving SCBG funding, making it the most successful nursery marketing program in existence. As additional states sign on, the message of the campaign strengthens.

The marketing campaign was broad-based, allowing access by nursery retailers and growers at all levels within the industry, and included venues that are most suitable for our message, including a combination of any/all of the following: a public relations campaign, media events, print/online advertising, website (buckeyegardening.com), and social media. (Note: buckeyegardening.com is a consumer landscape/garden website originally launched by ONLA in 2000. In 2013, ONLA redesigned and relaunched this already established URL/brand.)
Completed marketing pieces include: logos, print ads, point-of-purchase materials (bumper stickers, brochures, posters, window clings, large and small plant stakes), radio spots and 30-second public service announcement all featuring whimsical, attention-grabbing artwork conveying the theme, "Don't Just Stand There….Plant Something!" Plant Something's goal is to encourage Ohio-appropriate landscapes and educate the public about their benefits: lower utility bills, improved air quality, stress reduction, increased outdoor activity and a legacy of healthy landscapes for future generations. Based on our research, promoting our original *green* products, (i.e. Ohio grown plants), will increase consumption as well as public understanding of their many benefits.

This grant targets consumers through paid media and public events throughout Ohio to increase awareness of the Plant Something campaign, driving consumers to a website (buckeyegardening.com) which in turn directs them to their local retail nursery or garden center.

Garden Centers were surveyed in March 2014 to compare retail sales and customer-counts for the April-June 2013 period with the same period 2012. It was found, on average, sales and customer counts had increased 4-6% from 2012 to 2013.

Seed packets (50,000) were purchased containing Sweet Basil and Dwarf Sunflower seeds. The packets were specially designed and printed with the "Plant Something" message, along with instructions to visit Buckeyegardening.com and learn how to plant and care for them. Once on the site, consumers could learn more about the many benefits of landscape plants, link to the Plant-Something.org and search for garden centers in their area.

A promotional banner and tablecloth printed with the Plant Something name and logo to display at public events was also purchased. Full-page advertisements appeared in the ONLA magazine (T*he Buckeye),* along with a feature-length article announcing the campaign.

In 2014, we participated in 3 consumer events and distributed seed packets and brochures to thousands of consumers "Party for the Planet" event at the Cincinnati Zoo; "Earth Day" celebration at the Columbus Zoo; and "Tastings on the Terrace" at Franklin Park Conservatory. Also thousands of the seed packets and brochures were sent to other green industry businesses who participated in events in their communities. In September 2014, we exhibited at the National Planting Day at the Ohio Statehouse and distributed brochures promoting the Plant Something message.

In conjunction with the seed packet give away, we ran a Pay-Per-Click social media campaign that ran from April 17, 2014 - June 15, 2014 to capitalize on important gardening weekends (Easter, Mother's Day and Father's Day). The campaign tracked and verified the actual number of clicks on our online ads. Furthermore, a Father's Day video was distributed to retailers to use to promote giving plants as gifts for Father's Day.

National media exposure resulted when a feature length article in *American Nurseryman* magazine featured the Plant Something campaign in Ohio. Advertisements purchased in *The Buckeye* and the Columbus Landscape Association's annual garden tour program reached thousands of Central Ohio homeowners.

In 2015, 85,000 additional basil seed packets were purchased to distribute to 3rd grade classrooms across the state of Ohio. We sent an e-mail to all 3rd grade teachers and distributed seed packets to the requesting 220 classrooms. We updated Buckeyegardening.com which is the landing page for the Plant Something Ohio Campaign. We participated in the Earth Day celebration at the Columbus Zoo and distributed seed packets as well as planted the seeds with children. We then surveyed garden centers in January to compare retail sales and customers for April-June of 2014.

Goals & Outcomes Achieved

A measurable result was 4,429,618 impressions (Google Analytics) made by the online ads, which generated 13,480 clicks, and increased traffic to our consumer website from 2086 visitors in March 2014 to 15,895 visitors in April; 77% were new visitors. An electronic survey in December of 2014 determined awareness of the campaign and increased visits to garden centers as well as increased sales during the spring campaign period.

Retail participants of the Plant Something Campaign were surveyed about the percentage of sales increase/decrease from April, May & June of the appropriate years. Survey results between April through June of 2012 & 2013 are as follows:

1. No increase or decrease – 15%
2. 1-3 % increase – 15%

3. 4-6% increase – 38%
4. 7-10% increase – 15%
5. 11% or more – 15%

ONLA also surveyed the retail participants of the Plant Something Campaign during April, May and June of 2013 & 2014 with the results as follows indicated below:

1. No increase or decrease – 20%
2. 1-3 % increase – 25%
3. 4-6% increase – 20%
4. 7-10% increase – 30%
5. 11% or more – 5%

Beneficiaries

Local garden centers benefited from the grant as consumers were drawn to their businesses to purchase additional plants and trees for our targeted planting times. Based on survey results during specific time periods, retail participants noticed an increase of sales up to 7% or more. Our participants were pleased with the outcome of the grants results. Students across the state also gained awareness and education of the benefits of planting.

Lessons Learned

One significant setback occurred when ONLA Communications Director, Jennifer Gray, who wrote the grant proposal and was to be the lead project coordinator, resigned in November 2013. Her position was filled in February 2014 by Amanda Domsitz, who served as project coordinator.

In February 2014, the ONLA Retail Committee recommended we utilize social media more than traditional print and radio advertising, based upon their experience marketing to consumers. This led to redirecting our strategy and advertising budget more to the Pay-Per-Click approach than utilized.

Most garden centers were unwilling to share actual sales figures, so the survey was adjusted to measure increases/decreases in sales and customer visits during relevant time periods.

Participation in events in northern Ohio was limited the events were either sold-out or occurred too late in the season. Sweet Basil and Dwarf Sunflower seeds ideally should be planted by early June, and the events took place mid-June or later. Rather than distribute seeds later than ideal, several industry businesses were recruited to distribute materials at events in their communities. This actually had a “multiplier effect” that led to numerous volunteers promoting the Plant Something message around the state with a far greater reach than we could have accomplished on our own.

Another setback occurred when ONLA Executive Director, Kevin Thompson, who directed the grant, resigned in April of 2015. Six months later, in October of 2015, ONLA Communications Director, Amanda Domsitz also resigned.

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Additional Information
http://www.Buckeyegardening.com

http://plant-something.org/

"A Brave New Campaign" April 2014, *The Buckeye*. This article is available online at http://issuu.com/onla/docs/04april2014

"Plant Something" January/February 2014, *The Buckeye*. This article is available online at http://issuu.com/onla/docs/web_01janfeb2014

"Plant Something across Ohio" May 2014, *The Buckeye*. This article is available online at http://issuu.com/onla/docs/05may2014

"A Campaign to Cultivate Gardeners" June 2014, American Nurseryman. This article is available online at http://www.amerinursery.com/growing/a-campaign-to-cultivate-gardeners/

Project Title: ACEnet – Assist Specialty Crop Producers to Increase Market Access & Annual Sales

Project Summary
The ACEnet Specialty Crop Food Hub Project designed new training and technical assistance services for Appalachia Ohio fruit and vegetable growers utilizing ACEnet's new Nelsonville Food Hub to access institutional foodservice and grocery wholesale buyers. The renovation to the Nelsonville Food Hub was accomplished between July 2013 and through June 2015. The Nelsonville Food Hub now provides 15,000 square feet of space for specialty crop producers to aggregate, package, label, batch code and distribute to wholesales market channels. The Nelsonville Food Hub augments the warehousing capacity of ACEnet's Food Ventures Center in Athens and provides a new distribution hub to move produce from individual farms in the targeted counties and Rural Action's Chesterhill Produce Auction. Focus groups and surveys with wholesale market partners and regional produce distributors encouraged the development of the food hub to increase produce growers capacity to expand production to meet new opportunities from three demand categories: farm to college & farm to school; 30 Mile Meal restaurant parners and grocery wholesale buyers. This grant primarily provided staff time to deliver training and technical assistance to specialty crop farmers interested in expanding or diversifying market channels. The primary issue focused on agricultural production, processing and market access readiness to assist new and established specialty crop producers sell into restaurant, "Farm to

School" and grocery channels. The workshops and technical assistance also helped ACEnet and Rural Action assess and ultimately address some of the infrastructure and distribution logistics obstacles that keep specialty crop producers from entering wholesale market channels.

Project Approach

During 2014 and 2015 workshops, ACEnet staff provided surveys to gather equipment needs for the processing and distribution of vegetable and fruit crops. We used the surveys to gauge specialty crop producers interested in thermal processing, dehydration, flash freezing and vacuum packing. We also asked questions about warehousing needs for refrigerated and frozen products. The results of these surveys identified prioritized equipment, we purchased in 2015. The surveys were implemented with Specialty Crop funding targeting specialty crop beneficiaries. The results then leveraged foundation and USDA Rural Development funds to purchase large scale vacuum packing equipment to process vegetables for "Farm to School" buyers; a commercial dehydrator for vegetable and berry dehydration; and a large walk-in cooler and freezer for the Nelsonville Food Hub.

Beyond the design and implementation of the food hub network and facility, the project provided training to producers to serve wholesale markets. The training and technical assistance plan created curriculum and workshop delivery to prepare specialty crop producers for season extension, aggregation and distribution. Survey and interviews with potential market channels and regional distributors attracted regional foodservice distributors' interest to utilize the food hub in 2015 and future seasons. Other local demand channel buyers such as six County school district farm to school programs, Hocking College, Ohio University and regional retail buyers under the Country Fresh Stop program participated in planning, training and network development between hubs.

The following chart provides the workshop or webinar topics, the location and the number of specialty crop attendees. The attendee count only includes producers, however, many of the workshops also had other partners in attendance, so under the topics the full number of attendees are listed.

Training - Workshops – Webinars: ***Jan-December 2014***	**Date**	**Location**	**Attendees**
Regional Brand Training 30 Mile Meal Webinar	1/11/14	Licking County	12
Advanced Season Creation & Food Safety	1/23/14	Amesville-Green Edge	14
Social Media Marketing	2/7/14	Athens	8
Market Ready – Introduction to Market Channels	2/13/14	Perry County	17
Market Ready at OEFFA conference	2/15/14	Granville	33

Intro to Selling at Farmers Markets	3/1/14	Somerset	14
Cooperative Formation for Food Enterprises	3/4/14	Athens	7
Market Ready – wholesale to grocery	3/5/14	Athens	12
Season Creation	3/13/14	Amesville-Green Edge	13
Season Creation: The Green Edge Model of Winter	3/15/14	Somerset—Somerset Herbs	22
Social Media Marketing – Twitter, Instagram & Tumblr	3/17/14	Athens	16
30 Mile Meal Webinar	3/24/14	Perry & Licking	11
Fruit Tree Planting and Maintenance	3/27/14	Millfield (Solid Ground)	15
Food Ventures Orientation & GMP for Specialty Crops	3/29/14	Perry County	8
Regional Brands for Grocery Store Access	4/4/14	Athens	27
Branding Your Local Food Business for Restaurants	4/5/14	Somerset	15
Social Media – Facebook for Food Enterprises	4/7/14	Somerset	17
Cottage Food and Label Regulations for FDA Processing	4/12/14	Shawnee	4
Nelsonville Farmers Market Training	4/21/14	Nelsonville	23
Good Agricultural Practices (GAP) Training	4/22/14	Athens	11
GAP Training	4/22/14	Somerset	19
Athens Farmer Market Food Modernization	5/29/14	Athens	12
30 Mile Meal Webinar	5/29/14	Perry & Licking	11
Farm to School Conference (76 total attendees)	6/10/14	Nelsonville	15
Real Food Real Local Conference (3 days) 109 total	6/11-13	The Plains	21
Season Creation and Extension	6/20/14	Amesville-Green Edge	17
Season Creation and Extension	6/20/14	Amesville	24
MCBI --- Market Ready Workshop	7/30/14	Zanesville	5
Nelsonville – Market Ready Workshop	8/1/14	Nelsonville	11
RCAP Conference --- Specialty Food Branding	8/14/14	Columbus	17

Heritage Ohio Conference --- Branding	9/3/14	Sandusky	37
30 Mile Meal Workshop	9/8/14	Newark	9
Specialty Processing Facilities & Distribution	9/28/14	Ironton	14
Market Ready & Processing Facilities	10/2/14	Zanesville	26
Processing & Food Hub Facilities	10/8/14	Licking County tour	15
Processing & Food Hub Facilities	11/13/14	Stark County tour	12
Season Creation & Micro-greens Production	11/13/14	Amesville--Green Edge	30
Season Creation and GAP	12/11/14	Amesville--Green Edge	24

Training - Workshops – Webinars: **Jan-June 2015**	**Date**	**Location**	**Attendees**
Food Regulations – Navigating a Shifting Environment for Food Micro-businesses	1/29/2015	The Inn at Hocking College	47
NCIF Financing for Farmers	2/23/2015	ACEnet - Athens	7
Somerset 30 Mile Meal Introduction	2/23/2015	Somerset Court House	13
Selling at the Farmers Market	3/7/2015	Somerset Court House	4
REAP Training for Agricultural Producers	3/7/2015	ACEnet - Athens	3
Marketing Local Food for Retail	3/9/2015	Somerset Court House	4
Foodworks Alliance – Product Development for Start-up Food Businesses	3/19/2015	MCBI-Zanesville	6
Using Social Media to Market Your Local Food Business	3/21/205	Somerset Court House	3
Foodworks Alliance – Getting Market Ready for Start-up Food Processing	3/26/2015	MCBI-Zanesville	7
Selling at the Farmers Market	4/4/2015	Somerset Court House	3
Sourcing Local Food for Restaurants	4/6/2015	Somerset Court House	4
Risk & Financial Management	4/13/2015	ACEnet	4
Starting a Food Micro-processing for Produce	4/25/2015	Somerset Court House	3

Understanding Cottage Food Laws to Start a Food Business	4/23/2015	SPICE-New Straitsville	4
Accessing Community Capital and Grant Opportunities for Agricultural Producers (34 total)	5/21/2015	Food Hub Network	27
Keller Market House and Food Hub Development Meeting & FVC Tour (9)	6/10/2015	Fairfield & Hocking Counties	6
Real Food – Real Local Annual Conference	7/13-16/2015	Athens	105

Goals & Outcomes Achieved

Goal One activities enabled ACEnet and Rural Action to better coordinate an aggregation and distribution network between the Chesterhill Produce Auction, the ACEnet Food Ventures Center and the new Nelsonville Food Hub to accommodate increased flow of fruits and vegetables to the targeted wholesale demand outlets. The activities have identified and primarily recruited specialty crop growers in Athens, Meigs, Morgan and Washington counties.

We partnered with Ohio University to create a short ACEnet video for outreach and promotion that we will continue to use at outreach events, in social media and share with partners to promote our warehousing, processing and branding services. During the grant period 26 specialty crop producers have used the Food Ventures Center and/or the Nelsonville Food Hub for refrigerated storage, warehousing, packaging, thermal processing or flash freezing. An additional 17 specialty food producers have sourced ingredients from growers to produce product lines in the Food Ventures Center. Food Ventures Center staff did one to on training with specialty crop producers to develop FDA process flows, HACCP plans and train workers on safe food handling, Good Manufacturing Practices and the thermal processing room equipment. One additional staff member, Marcus Bratton went to thermal processing school at Cornell in May to accommodate growing demand. Hugus Fruit Farm is pictured below processing applesauce in November.



ACEnet, Rural Action and the Hocking College Culinary Arts program collaborated to aggregate, process and distribute produce from the Chesterhill Produce Auction and the other locations to Athens area school districts. The program eliminates food prep barriers faced by local schools, while eliminating Hocking's tradition of composting culinary students' work. It sources ingredients from the Chesterhill Produce Auction, Vest Berries, and Jackie O's Barrel Farm. The Farm to Institution to School concept has eliminated preparation barriers in local K-12 school districts by utilizing the expertise and training time of Hocking College Culinary school staff and students to perform this work instead. Additional businesses such as Casa Nueva Manufacturing and the Barrel Ridge Farm provided school talks and tours to the Food Ventures Center to see the produce being cut and frozen.

Examples of produce being prepped, vacuumed sealed and frozen for Athens area schools

Local corn, green beans and squash have also been processed and frozen for the local schools foodservice operations. Local processors: Casa Nueva manufacturing and Barrel Ridge Farm also utilized processing and freezing equipment to prototype foodservice products utilizing locally grown ingredients. The Hocking College partnership will provide additional workforce training capacity for processors expanding farm to school market opportunities.

Goal Two activities focused on the delivery of customized training and market tools to cover GAP, season extension, HACCP technical assistance and marketing and branding assistance to specialty crop producers. We also identified producers interested in expanding into wholesale and new direct markets ready to utilize the Nelsonville Food Hub, The Chesterhill Produce Auction and the Food Ventures Center. In 2014 and 2015, 182 specialty crop producers have participated in trainings and workshops covering Season Extension, FDA processing technical assistance and Good Agricultural Practices. Season Extension, Micro-greens and GAP training was led by our partners Rural Action and Green Edge Organic Gardens.

Other Market Ready, introduction to Market Maker, 30 Mile Meal brand marketing, marketing through farmers markets and social media trainings were also presented throughout 2014 and 2015. Most of the workshops were held during the winter, spring and late fall seasons. We presented trainings in Athens, Morgan, Perry and Muskingum counties and partners with other food enterprise and food hub facilities: including the MCBI Foodworks Alliance, the Perry County Farmers Cooperative, the Perry County Famers Pantry and Community Kitchen and the Chesterhill Produce Auction. Many of the workshops were also hosted at the ACEnet Food Ventures Center and included a tour and orientation of the thermal processing room and the flash freezing

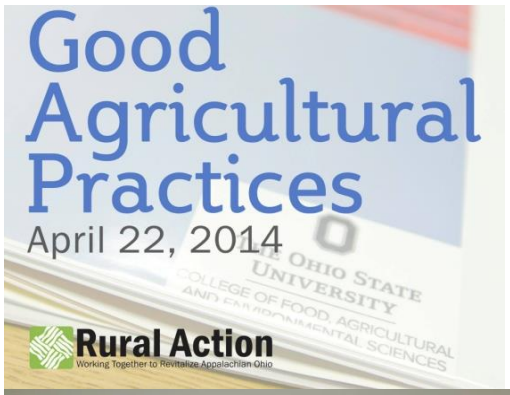
equipment. In the project time frame 18 workshops were presented and 57 specialty crop producers participated.

Surveys and feedback for wholesale market channels were gathered at Market Ready, Farm to School, GAP, Season Creation and Farmers Market trainings. An excel database was developed that identifies over 150 specialty crop producers using the ACEnet facilities, their market channels (direct & wholesale,) their participation in either the 30 Mile Meal or Food We Love regional brands, their on-farm processing capabilities and their utilization of either the Food Ventures Center and/or the Nelsonville Food Hub. This spreadsheet is regularly updated at a minimum on a quarterly basis.

The complete listing of workshops is covered in the charts above. Marketing, Branding, GAP and Season Creation workshops are offered regularly. Managing of the financial management components were contained in the Market Ready, Risk Management and Financing and Grants workshops. On-going participation is collected by ACEnet and Rural Action and added to the excel spreadsheet tracking. GAP training is continuing through partnerships with Rural Action, OSU Extension and other funding partners. ACEnet technical assistance for Good Manufacturing Practices and HACCP plans is on-going. The facility licensing changes in 2015 impacted the Food Ventures Center usage in summer and fall 2015 with some specialty crop producers opting out of paying the new $200 annual licensed processors fee. ACEnet training staff and incubator managers are now developing training materials to prepare for the 2016 harvest season and more proactively assisting previous or new specialty crop producers for compliance in 2016. Although we have more users interested in doing frozen products for restaurants and institutional buyers we need to overcome some of these new perceived obstacles.

As mentioned earlier, workshop attendees were surveyed on both their on-farm capability needs and their interest in utilizing the ACEnet Food Ventures Center or Nelsonville Food Hub. Over 150 specialty crop producers are now in the database and continue to be tracked. Between 2015 and mid-2015, eight specialty crop producers started or expanded the number of high tunnels on their farms, 1 family farmer created an FDA licensed processing facility for fermented foods, and 2 farmers built pack houses. As of the fall of 2015, 3 specialty crop producers utilize storage in the Nelsonville Food Hub. Rural Action and Hocking College also have frozen food products warehoused for 6 area school systems.

The 2014 Real Food Real Local Conference hosted 109 total attendees, 21 were specialty crop producers. The 2015 conference hosted 105 total attendees, 23 were specialty crop producers and processors. Non-specialty crop producers attending the conference include: food hub managers, kitchen incubator managers, wholesale market buyers, OSU extension staff, educators, Farm to School advocates, farmers market managers and 30 Mile Meal brand managers.



OSU Extension and Rural Action workshops on GAP

Rural Action & Green Edge Organic Gardens Season Extension & ACEnet Food Hubs Workshop

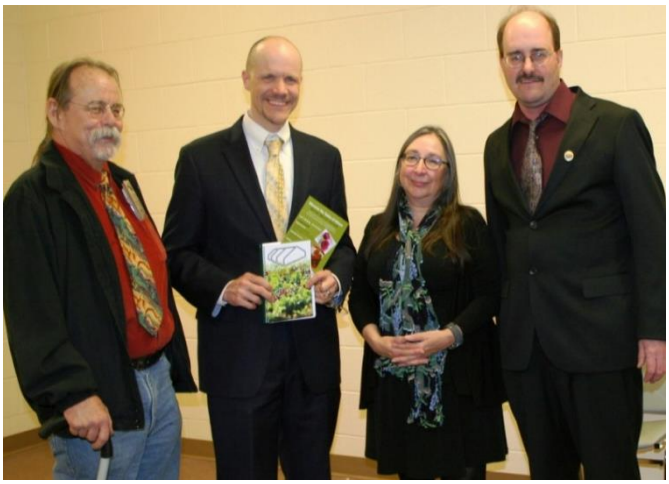
November 13the Workshop with 30 attendees in Amesville, Ohio

Goal Three activities included research, interviews and pilot market partnership with wholesale market channel partners: restaurant and food truck foodservice buyers, K-12 school buyers, Farm to College buyers and distributors, and wholesale grocery buyers. ACEnet staff also worked with other network partners in Ohio and West Virginia: the Ohio Hub Network, Good Food Enterprises, MORPC, Ohio Cooperative Development, the Wild Ramp-Huntington and the West Virginia Food and Farm Coalition to establish improved distribution systems for southern Ohio specialty crop producers selling into Columbus, Parkersburg and Huntington. Somewhat ironically we have had more success in strengthening West Virginia wholesale and distribution systems moving more fresh produce and value-added items with specialty crop ingredients into the hospitals, colleges and retail markets.

The June 2014, Real Food Real Local Conference attracted both new foodservice buyers and specialty crop buyers looking to expand or initiate local purchasing/selling of fruit and vegetables. In attendance were buyers from Kroger, Bon Appetit, Ohio University, Hocking College and numerous restaurant owners. 30 Mile Meal restaurant and food truck partners had the largest increase in poundage, sales and number of new foodservice buyers this summer to source local produce. Many of the market partners are doing a better job investing time and money for in house restaurant signage, menu information, seasonal special creation and social media messaging now that produce growers understand how to do wholesale from the Market Ready workshops. More farmers' market produce growers are now expanding into restaurant sales as well because of Buyer-Seller gathering and workshops.

Ohio University Mini-Farmers Market attracted five new specialty crop growers & Kiser's Salad Bar Sign

The Athens Farmers Market added a third day this year from June through September on Thursdays from 4 to 7 pm to accommodate fifteen additional specialty crop growers who had been on the waiting list. We also had an additional 12 produce growers begin to attend the Nelsonville Farmers Market, the Somerset Farmers Market and the OU Mini-Market summer of 2014.
Goal Four activities have provided the staff capacity and partnership coordination to plan, secure funding and equip the Nelsonville Incubator as a produce food hub and connect the distribution systems between the Food Ventures Center, The Nelsonville Food Hub and the Chesterhill Produce Auction.
Since the beginning of this year we have secured funding from both an ACEnet and Rural Action RBEG awards to upgrade the thermal processing and flash freezing capacity in the Food Ventures Center and install walk-in coolers, freezers and dehydration equipment in the Nelsonville Food Hub and the Food Ventures Center.



Surveys to producers identified dehydration as another processing need. In fall 2015 ACEnet secured a commercial dehydrator and large scale vacuum packaging equipment which will be installed in the ACEnet Nelsonville Food Hub.

The photo to the right shows the USDA announcement of equipment funding by Doug O'Brien for Appalachian Food Hub Network at the Nelsonville Food Hub. In October, ACEnet, Rural Action and Community Food Initiatives received a two year grant for $355,000 to hire network hub and distribution staff, a refrigerated truck and additional packaging, freezing and warehouse equipment. The ODA funds which have provided the staff time to assess both specialty crop producers and market channels for produce played a critical factor in our ability to leverage these additional funds.

Beneficiaries
Specialty crop producer from Athens, Washington, Vinton, Morgan, Perry and Muskingum counties participated in workshops and technical assistance services. During the project period we developed the Southeast Ohio Food Hub Network with other food enterprise and food hub facilities: including the MCBI Foodworks Alliance, the Perry County Farmers Cooperative, the Perry County Famers Pantry and Community Kitchen and the Chesterhill Produce Auction that provides an improved outreach and services promotion platform for making specialty crop producers aware of GAP, HACCP, Season Extension, FDA and Market Ready trainings. Over 200 specialty crop producers participated in workshops. 30 Mile Meal restaurant partners increased their purchasing of local produce by 10% over a 24 month timeframe. Five farm operators attending Season Extension workshops built 7 additional high tunnels creating more winter crop production for restaurants and school demand channels.

Lessons Learned
The project funding provided staff capacity to more efficiently provide training and technical assistance to the variety of other food hub and kitchen incubator partners throughout southeastern Ohio, but most fruitfully in Morgan, Perry and Muskingum counties. The changes with FSMA and the Ohio FDA inspection and licensing changes also have had significant impacts on specialty crop producers interested in using our facilities for value-adding either through a frozen or thermal process. Having support for one on one technical assistance was critical in 2015 to make sure we would not lose producers as Food Ventures tenants or impinge on their opportunity to continue processing.

The funding also allowed us to leverage considerable funding and equipment donations for the Nelsonville Food Hub phase one development. This has helped us make inroads with produce distributors in Ohio and West Virginia metro areas to demonstrate our ability to aggregate local produce.

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Additional Information

Farm to Institution to School

Project Title: OSU -- Sanitizing Tomato Seed Treatments to Address Two Emerging Trends in Ohio:

Project Summary

This project was designed to identify treatments to minimize the risks of entry of seed borne plant and human pathogens into Ohio tomato production systems. The project was of importance because bacterial contamination of tomatoes continues to be a growing issue for food safety. Tomato diseases caused by seed borne bacterial phytopathogens such as *Clavibacter michiganensis* subsp. *michiganensis*, have increased in incidence and severity in Ohio and other states, likely related to the effects of climate change. Bacterial diseases can result in severe crop losses. The human pathogen *Salmonella* can reside on tomato seeds and thus can be carried onto plants and potentially to produce. Since both pathogens are seed-borne, identifying successful treatments that reduce pathogen survival in seed can help achieving disease free plants. OSU-OARDC researchers teamed with Dr. Alan Taylor, an expert in seed coating and treatment applications from Cornell University in Geneva, and Dr. Melanie Lewis Ivey at Louisiana State University, an expert in co-management of plant and human pathogens, to identify seed treatments compatible with pelleted tomato seed. There were two main objectives for this project:

Objective 1: To reduce the incidence of plant and human bacterial pathogens on tomato seedlings by identifying effective seed sanitation practices for pelleted seeds.

Objective 2: To determine the longevity and vigor of tomato seed following seed treatments.

Project Approach

Efficacy of sanitizing seed treatments: Tomato seeds cv. Hypeel 696 were used for the study. Experiments were conducted using bioluminescent strains of *Clavibacter* and *Salmonella enterica* serovar *typhimurium*, which can be detected using bioluminescence imaging with a highly sensitive charge-coupled device (CCD) camera (In vitro Imaging System; IVIS). For this study, seeds were inoculated with a bacterial suspension of 10^8 CFU/ml. Seeds were infested with either pathogen using vacuum infiltration. Seed treatments were conducted at OSU or Cornell University New York State Agricultural Experiment Station (Geneva). The following treatments were applied:

1. Virkon (potassium peroxymonosulfate): seeds soaked in 2% Virkon solution.
2. Virkon (2% solution) applied as an outer layer of the pellet at 20% of the pellet weight.
3. TCM-1 (Trichloromelamine): seeds soaked in 0.5% TCM solution.
4. TCM-2 (0.5% solution) applied as an outer layer of the pellet at 20% of the pellet weight.
5. Selenium: seeds were soaked in a 320 ppm solution of sodium selenite.
6. Dry heat: (1) dry heat at 50^0C for 4 hours, and then at 75^0C for 24 hours; (2) dry heat at 70^0C for 24 hours.
7. Microwave: 20 seconds at high power.

Two separate experiments were designed to test the effect of treatments on *Clavibacter* and *Salmonella* survival.

1. Seeds were placed on water-agar in 9-cm Petri dishes, and were allowed to germinate. Two separate trials were performed, with different temperature controls. In the first trial, the water-agar plates were kept at ambient room conditions for 4-5 days, for both *Clavibacter*- and *Salmonella*-infested seeds. For the second trial, *Clavibacter*-infested seeds were allowed to germinate at 28^0 C for 5 days and *Salmonella*-infested seeds were maintained at 37^0 C for 5 days, then at 28^0C. In both trials, the germination percentage was calculated; seedlings were weighed, and then processed with sterile water, serially diluted and plated on mCMM and LB media for *Clavibacter*- and *Salmonella*- infested seeds, respectively.

2. Seeds were sown in flats containing seed germination mix, and were allowed to grow for 14 days in the greenhouse. Germination and weight was then noted and seedlings were processed with sterile water, serially diluted and plated on mCMM or LB medium. The presence of bioluminescent bacteria was determined using IVIS. Since neither *Clavibacter* nor *Salmonella* was recovered from seedlings in the first trial, growth chambers were used in the second trial to provide optimal temperature and humidity conditions for the pathogens. Ten seedlings per replication were processed, serially diluted and plated soon after germination and the remainder was allowed to grow for 14 days for final weight and height determinations.

Additional tests were performed to evaluate the effect of treatments on the pellet integrity and seed germination after prolonged storage.

Pellet integrity after treatment: Seeds from all treatments were placed in small glass bottles, and were subjected to vigorous shaking for 30 seconds. The seeds with broken pellets were counted and fragmentation percent was calculated for all treatments. The experiment was done twice.

Seed vigor after treatment: An accelerated aging test, used to predict the storage ability of seed lots, was performed to test seed vigor. Seeds from all treatments and controls were placed on mesh

screens in individual plastic containers containing saturated salt solution (40% NaCl solution) and wrapped tightly in parafilm to create high humidity conditions. The boxes were maintained at room temperature for 1 week, followed by incubation at 41^0C. Seeds were sown onto germination mix after 48 and 72 hours of rapid aging, and seedling emergence (percent germination and delay in germination), and height and weight of the seedlings were recorded.

Goals & Outcomes Achieved

Efficacy of sanitizing seed treatments: Variation in results was found between the two experiments with *Clavibacter*- and *Salmonella*-infested seed. In the first experiment, only the dry heat (1) treatment reduced *Clavibacter* to nearly non-detectable levels on germinated seedlings. None of the treatments affected percent germination or weight of seedlings compared to the pelleted, non-treated control. In the second experiment, all treatments, with the exception of TCM applied after pelleting and the selenium treatment, resulted in non-detectable levels of *Clavibacter* on seedlings germinated on water agar. None of the treatments affected seed germination but the Virkon treatments significantly reduced seedling weight in this experiment. Only TCM applied to pelleted seed reduced *Salmonella* to non-detectable levels in the first experiment conducted at room temperature. None of the treatments reduced seed germination, although the Virkon soak treatment reduced seedling weight. In the second experiment conducted at 37^0 C followed by 28^0 C, no treatment eliminated *Salmonella* from seeds. Germination and seedling weight were not affected by these treatments.

Clavibacter or *Salmonella* was unable to be detected from seedlings arising from seeds exposed to any or the treatments or the non-treated controls and sown in planting mix followed by incubation in a greenhouse or growth chamber. For *Clavibacter*-infested seeds, treatment with dry heat or microwave reduced seedling emergence compared to the non-treated control, but plant height was not affected. None of the treatments reduced seedling emergence, weight or height in the second experiment. For *Salmonella*-infested seeds, results also varied somewhat between experiments. For seeds sown in plant mix and maintained under ambient conditions, there were no differences in weight per plant or seedling emergence for treated vs non-treated seed, but the dry heat and microwave treatments significantly reduced seedling height compared to the non-treated control. In the second experiment, there were no differences in any of the tested parameters between treatments and the non-treated control.

Pellet integrity after treatment: Seeds treated by soaking in TCM solution showed the least fragmentation. Dry heat-treated seeds were most fragile, with a higher fragmentation rate than other treatments or the control.

Seed vigor after treatment: With the exception of the dry heat (1) treatment, none of the treatments significantly reduced seed vigor parameters including germination rate, shoot weight or height, or root weight compared to the non-treated control. The dry heat treatment resulted in lower root weight than in the non-treated control.

In summary, contrary to popular belief, most sanitizing seed treatments have little effect on seed germination or the height or weight of seedlings arising from treated seeds. These seeds had not been primed prior to treatment, which may have affected the germination rates and seed vigor in

sanitized seeds. Unfortunately, due to variability between experiments, it is not possible at this time to highlight a particular seed treatment to reduce *Clavibacter* contamination of seeds, with the possible exception of the dry heat treatment. However, dry heat treatment requires further analysis due to inconsistent seed germination and seedling vigor results. TCM treatment was effective in one experiment in reducing *Salmonella* counts to undetectable levels. Additional research is needed to identify treatments or combinations of treatments that can simultaneously reduce counts of both pathogens from tomato seeds.

Growers were not surveyed on seed treatment technology because the results of the project were inconclusive due to inter-experiment variability. Additional research is needed to identify new treatments or combinations of treatments to eradicate both plant and human pathogens from seeds.

The iBook is also still under development and growers will be surveyed at a later date after completion (using other, non-grant funds). Altmetrics from the online hot water and chlorine seed treatment videos will provide an indication of interest in standard seed treatments.

Lewis Ivey, M.L. and Miller, S.A. 2014. Hot Water Treatment of Vegetables Seeds Instructional Video. (English and Spanish). https://www.youtube.com/user/LSUagcenter.

Lewis Ivey, M.L. and Miller, S.A. 2014. Chlorine Treatment of Vegetables Seeds Instructional Video. (English and Spanish). https://www.youtube.com/user/LSUagcenter.

Beneficiaries

In the long term, direct beneficiaries of this project will be both seed producers, who may opt to include sanitizing seed treatments into their seed production process, and seedling propagators who currently conduct sanitation treatments such as hot water or Clorox treatments that are incompatible with current industry practices of priming and pelleting vegetable seeds. Indirect beneficiaries are tomato producers, due to reduced risk of seed borne bacterial pathogens, and consumers of fresh tomatoes.

The attendees at the events were almost exclusively vegetable growers, nearly all of whom produce vegetables including tomatoes from transplants. These growers either produce the transplants themselves or purchase them from others. All are beneficiaries of the information since the seed treatments can be done by the transplant producer. Further, all will benefit from increased knowledge of the risks of seed borne plant and human pathogens in vegetable production systems.

Event	**Date**	**Attendance**
New Jersey Ag Convention and Trade Show, Atlantic City, NJ	February 4, 2015	75
Muck Crops Grower School, Willard, OH	January 8, 2015	60
Ohio Produce Growers and	January 21, 2015	45

Marketers Association Congress, Sandusky, OH		
Louisiana Regional Home Vegetable Garden Workshop, Winnsboro, LA	February 19, 2015	45

Lessons Learned
Additional research will be needed to explore seed sanitation approaches that can be effective against a broad range of plant and human pathogens, while maintaining seed vigor.

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Additional Information
Publications
Egel, D., Foster, R., Maynard, E., Weinzierl, R , Babadoost, M , Cloyd, R , O'Malley, P , Nair, A., Cloyd, R., Rivard, C., Kennelly, M., Hutchison, B., Pinero, J., Welty, C. and Miller, S. A. 2014. Midwest Vegetable Production Guide. West Lafayette: Purdue University.

Lewis Ivey, M.L. and Miller, S.A. 2015. Development of innovative multi-level knowledge based tomato disease factsheets. Acta Hort. 1069:211-219.

Lewis Ivey, M. L., Xu, X. and Miller, S. A. 2014. Leveraging management strategies for seedborne plant diseases to reduce *Salmonella enterica* Serovar Typhimurium incidence on tomato seed and seedlings. J. Food Protection 77:359-364.

Lewis Ivey, M.L. Seed Treatments. Kemble, J.M., Quesada-Ocampo, L.M., Lewis Ivey, M.L., Jennings, K.M., Walgenbach, J.F. (Eds). 2015 Southeastern U.S. Vegetable Crop Handbook. pp. 234-236.

Lewis Ivey, M.L. and Miller, S.A. 2014. Hot Water Treatment of Vegetables Seeds Instructional Video. (English and Spanish). https://www.youtube.com/user/LSUagcenter.

Lewis Ivey, M.L. and Miller, S.A. 2014. Chlorine Treatment of Vegetables Seeds Instructional Video. (English and Spanish). https://www.youtube.com/user/LSUagcenter.

Project Title: OSU -- Validation of Waiting Intervals

Project Summary
The risks associated with the use of untreated soil amendments of animal origin (bovine manure) on melons as a function of time of soil application were assessed. Manure was applied to soils 270, 180, 120 and 90 days prior to expected harvest of cantaloupes. Total coliforms and *E. coli* counts and pathogen (*Listeria*, *Salmonella*, *E. coli* O157 and *Campylobacter*) presence was assayed monthly in soils and on melons at harvest from three separate commercial farms. *E. coli* counts declined over time, and approached baseline levels after approximately 90 days. Pathogens

were detected sporadically from soils and from melons, both from amended and control (non-amended) plots at similar frequencies. In this single season waiting more than three months after manure application did not statistically reduce the likelihood of pathogen detection or the total *E. coli* counts in the soil. Notwithstanding the detection of the pathogens on melons (grown on plastic) at harvest, even in un-amended plots, raises concern about the sources of pathogens on melons. The study is being repeated to determine if the results were consistent across years.

In year two, a field experiment to determine the survival of E. coli and several foodborne pathogens (E. coli O157, Campylobacter jejuni, Listeria monocytogens, and Salmonella enterica) in fields fertilized with fresh bovine manure at 270, 180, 120, and 90 days prior to expected harvest. This was a replication of an identical study conducted on the same three farms in the previous season. E. coli counts declined in soils following field application, generally achieving similar levels as that found in un-manured adjacent control plots by about three months. In all cases, regardless of the post-application waiting interval, the E.coli counts in soils were similar amongst all treatment groups and the negative control groups. Pathogens were identified in the manure used for fertilization, the soils (both fertilized and control plots) and on melons grown in treatment and control plots.

Project Approach

The production of safe and wholesome produce is a priority for Ohio specialty crop farmers. In order to remain competitive, this goal must be achieved within the emerging regulatory framework, notably the Food Safety Modernization Act (FSMA). Incorporation of animal manures into the soil is an important source of nutrients and a manner to dispose of animal waste. At the time of commencement of this project, the Act proposed increasing the permissible interval between the application of untreated manure to field and harvest to 270 days. The hypothesis of this project is that increasing the interval from 120 to 270 days does not significantly improve food safety under conditions typical of small-scale Ohio specialty crop producers. Over the course of 11 months, 99 soil samples were collected from three different fields that had manure applied 270 prior to expected harvest. DNA was extracted from all soil samples. Shotgun DNA sequencing was performed on extracted soil DNA.

Multiple productive meetings with stakeholders were held. These meetings resulted in the finalization of experimental plans, including the identification of field plots and sources of manure, and, importantly, the harmonization of management practices on three different commercial farms where the experiments were conducted. Manure was screened for pathogens prevalence prior to each application date. Pathogens were detected in manure on multiple occasions.

Factors impacting pathogens soiled were modeled. Published in: Soil Conditions That Can Alter Natural Suppression of Escherichia coli O157:H7 in Ohio Specialty Crop Soils. Appl. Environ. Microbiol. July 2015 vol. 81 no. 14 4634-4641. Additional studies (metagenomic analysis) are ongoing and will be submitted for peer-review.

In regards to the 80 manure application, over the course of 6 months, 72 soil samples were collected from three different fields that has manure applied 180 days prior to expected harvest. Results of these experiments were reported at the Mid-Ohio Vegetable Produce Growers meeting (Jan 15, 2016) with 160 attendees, and to 35 attendees at the OPGMA annual meeting Jan 19, 2016. Microbiome analyses, continued monitoring of fields and microcosms and DNA was extracted from all soil samples. Shotgun DNA sequencing was performed on extracted soil DNA. Data analysis is still ongoing.

120 manure application: Over the course of 4 months, 54 soil samples were collected from three different fields that has manure applied 120 days prior to expected harvest. The 90 manure application: Over the course of 3 months, 45 soil samples were collected from three different fields that has manure applied 90 days prior to expected harvest. Microbiome sequencing and analysis included DNA being extracted from soil microcosms. The soil survival analyses showed that E. coli counts declined in soils following field application, generally achieving similar levels as that found in un-manured adjacent control plots by about three months. Vegetable sampling from over 225 melons were collected and tested for E. coli O157, Campylobacter jejuni, Listeria monocytogenes and Salmonella enterica. Data Analysis presented data at IAFP (Indianapolis). A poster presentation was submitted (and accepted) and presented at IAFP, 2015, Portland Oregon.

Goals & Outcomes Achieved

This study provides the first data concerning the survival of bacteria and specific pathogens in Ohio specialty crop soils. Even with changes in the Act, this project is of particular importance as it provides small scale Ohio farms real data on which they can base their management practices related to manure application.

Our data supports the hypothesis that post-application waiting intervals as short as 90 days, provide the same degree microbial contamination risk as waiting for 270 days. The proposed FSMA regulations were modified and the 270 day waiting interval was removed. These data will provide information on relative risks of various post-application harvest intervals.

The information has been shared directly with stakeholders throughout Ohio in OSU Extension outreach activities, at the Ohio Produce Growers and Marketing Association's Annual meeting and in their newsletter, and most importantly, through informal social networks among small farmers targeting the Amish community. This includes communications through the Mt. Hope Produce Auction, Yoder's Produce Supply Company, and providing information to key community leaders. Manuscripts for peer-review and publication in the scientific literature are being prepared.

Beneficiaries

This project provides benefit to all Ohio produce growers to allow them to make risk-informed decisions about manure application. All consumers who purchase Ohio Produce also benefit through the growers' adoption of these recommendations that lead to lower risks of product contamination.

In Ohio, it is estimated that the annual economic costs of foodborne illnesses is between $91 and $624 for every man, woman and child in the State, or $1-$7 billion. Half of all foodborne illnesses are attributed to fresh fruits and vegetables. The adoption of farm management practices that reduce produce contamination can impact the rate of product contamination and thereby reduce human suffering, illnesses, deaths, and associated public health costs. Although the fraction of produce contamination that is attributable to the use of raw manure and insufficient post-application harvest intervals is unknown, these data provide scientific evidence to establish these intervals to minimize contamination and enhance food safety.

Based on this data, farmers may choose to adopt the practices of waiting 90 days prior to harvest following manure application for crops grown on plastic (no direct contact with the soil). Based on this single year's data, the need to wait for 120 days, as recommended by the USDA's National Organic Program, is not fully justified to reduce risks. USDA's National Organic Program, is not fully justified to reduce risks.

Lessons Learned

This project was initiated based on Ohio farmers need for information. Although research on commercial farms by farmer decreases the control over experimental conditions and the way the work is performed, this drawback is far outweighed by the benefit of having the outcomes better reflects how things actually happen in the field. Moreover, the continued community engagement has generated widespread interest and communication within the target population and natural peer-to-peer dissemination of information is highly effective.

As with most research, one question was answered (waiting interval required to reduce risk to baseline), but other questions arose: Specifically, the source and route of contamination of the melons at harvest remains enigmatic.

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